



FRIDAY, JAN. 12, 1894.

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## Contributions.

## Transition Curves.

Will the gentleman who signs his communication "Tangent" kindly send his name and address? Otherwise it is impossible for us to publish his communication.

## Another Pass Fraud.

We are requested to warn railroads against issuing passes to a person who signs himself J. J. Morehouse, General Manager Chambersburg & Gettysburg Railroad. Mr. Morehouse has not been connected with that railroad for more than a year, but we have before us a letter dated Nov. 17, 1893, written on the letter head of the railroad bearing his name as General Manager.

## Uses of Cattle Guards.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the communication from "Loco" of Insein, Burma, and your comments on the same in the *Railroad Gazette* of Jan. 5, I would call attention to the fact that the protection of bridges and tunnels by the use of cattle-guards and fences is practiced in this country. Most of the bridges and tunnels, as well as some of the deep, narrow, rock cuts, on the Cincinnati Southern Railway are protected in this manner. In the case of bridges the cattle guard is placed on the embankment some distance from the end of the bridge, and the fence built along each side from the cattle guard either passing under the first span or connecting with the stone abutment, thus preventing cattle from getting on the bridge. The tunnels usually have the entire approach fenced, the fence passing over the portal and the cattle guard placed near the end of the approach.

WM. C. JEWETT, M. Am. Soc. C. E.

## The Finish of Locomotives.

NEW YORK, Jan. 2, 1894.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

I see an editorial of Dec. 29 defends American locomotives in the matter of appearance. That is good and ought to be done, but can't we finish details simply and harmoniously, and also improve the general appearance of the engine and tender, taken together, by introducing greater continuity of outline from the one to the other and smoothing off some of the embellishments and crookedness and independencies to which the German refers, without at the same time sacrificing the great advantages we have with open or unencased finish?

M. P.

[Undoubtedly the designers of American rolling stock, not only locomotives, but cars, have a good deal to learn yet about the esthetics of design, and they must have learned a good deal at the World's Fair. They must have seen many examples which suggested to them that it is possible to have a machine efficient and economical and at the same time look well. Grace of line was shown in many of the minor parts of the English and German rolling stock, where nobody in America seems to think that it is possible to introduce it, and yet the highest type of design is that which combines grace with utility. Probably no one but a Philistine will dispute so wise and yet so commonplace an utterance as this.—Editor RAILROAD GAZETTE.]

## Railroad Extension in England.

BY W. M. ACWORTH.

A year back I contributed to the *Railroad Gazette* an article with the above title. I then pointed out that, as the English law made it impossible for any new railway to be built, or any existing line to be extended, without the authority of a special act of Parliament

and, as Parliament itself has prescribed, that, of any project for which legislative sanction is to be sought in the following session, notice must be given in the November preceding, Englishmen have before them every autumn the railway programme for the ensuing year. The programme for 1893 was dull and meager. We now know that that for 1894 is yet more dull and yet more meager. Financial stringency, labor troubles, grandmotherly legislation as to safety appliances and methods of train-working, and, lastly and chiefly, the shock to confidence given by the compulsory reduction of statutory maximum rates, have among them brought railway construction to an almost absolute standstill. Nowhere is the falling off more conspicuous than in London itself. Two years back there were six or eight underground electric lines projected. Last year there were two more. This year there is only one, a scheme for a line to run out eastward from the City, through densely peopled working-class suburbs to the outskirts of Epping Forest. The Central London Company, which three years back obtained possession of the greatest artery of traffic in the world, but which has not yet issued a prospectus, much less begun to construct its line, now seeks for power to extend the time during which it can commence condemnation proceedings.

Leaving London, the Great Western proposes to construct a new line to the west of England, which will avoid the *détour* by Bath and Bristol, and relieve the glut of traffic on Brunel's old road. The reason for this step may perhaps be found in the fact that down in Cornwall a new company, a dependency of the rival London & South Western, proposes an extension from Wadebridge to Truro, which would tap one of the most valuable sources of Great Western traffic. As illustrating the permanence of English conditions, it is perhaps worth mention that this new company, the North Cornwall, claims compulsory running powers—in America, I believe, you call them "trackage rights"—over the Great Western from Truro to Falmouth and the Lands End, by virtue of an act of Parliament passed in 1845, when the "Battle of the Gauges" was raging, and when the railway mania was just rising to its culminating point.

In another part of the Great Western system a new line is projected of more than merely local interest. It is to run from Birmingham to Stratford-on-Avon, a town which Americans are commonly reputed to know better than Englishmen. But its interest does not stop there, for at Stratford it makes connection with an existing line, the East and West Junction, which carries it on to within a few miles of Aylesbury. Then the new line of the Sheffield company, which was sanctioned last year, will carry it forward to that point, and at Aylesbury it comes in contact with the Metropolitan railway, of which, as also of the Sheffield company, Sir Edward Watkin, the solitary go-ahead railway promoter still left in England, is the Chairman. So in this way a new competing route will be formed all the way from London to Birmingham.

The mention of Sir Edward Watkin naturally suggests notice of the fact that the Channel tunnel and the Channel bridge projects are both to be brought forward once more. In the present temper of public opinion the only thing more unlikely than their obtaining leave to proceed at all is that, having got their act, they should find investors to subscribe the necessary capital.

But to return to the West of England, or rather to Wales; the Great Western has had a line to Milford Haven for nearly half a century, but so far it has not done much to develop the possibilities of Milford as a port for the Atlantic trade. The projectors of your Long Island scheme will be glad to hear that a new railway is this year to be promoted from Milford to Carmarthen, where connection can be made with the North Western and with the Cambrian, and so with the general railway system of the country, wholly independent of Great Western control. South Wales, indeed, is at the present moment the only prosperous district in the country. In the steam-coal region behind Cardiff there are three or four important extension projects on foot, and all the docks along the coast are either increasing or about to increase their accommodation. South Wales, by-the-by, has been agitating for some time past for a new trunk line to London. The line is not forthcoming just yet, but, by way of putting a spoke in its wheel, the Great Western, which already owns the Severn Tunnel, has now agreed to buy up, jointly with the Midland, the Severn Bridge, the only other means of communication across a wide and difficult estuary with a range of tide something like 50 ft. The bargain, however, needs confirmation by Parliament. Whether that confirmation will be granted remains to be seen.

There are only two other schemes in England which I need notice. A new company called the Sheffield Central promotes a bill for the establishment of what you would call a union depot in the heart of the city of the same name. The scheme seems on the face of it a very good one, for the existing stations are both small and inconveniently placed, but whether the various companies will be induced to come into it is still uncertain. There is a strong feeling here in favor of each company maintaining its independence and reserving a free hand to deal with its own business in its own way.

Up in the Northeast, on the coast of Durham, there is

another interesting problem. In the heart of the district monopolized by the North Eastern there is a small railway running a few miles, from Sunderland to Seaham, which is the private property of the Marquis of Londonderry, a millionaire coalowner. That this railway should be continued southward from Seaham to Hartlepool is admittedly an urgent local necessity. Last year a small independent company sought leave to make the line, but its bill was rejected for obvious engineering faults. This year not only does the small company come forward again, but the North Eastern company itself promotes a practically identical line. Lord Londonderry, it is understood, will support the North Eastern in preference to the new company, and presumably Providence will declare itself on the side of the big battalions. But the decision of Parliament will be not without interest as at least one straw to show how the ever-veering wind of public opinion shifts between the two points of competition and monopoly.

There is one scheme of public interest in Scotland, an extension of the West Highland Railway, from Fort William, on the Caledonian Canal, across the barren and desolate deer forests of Invernesshire to the West Coast at Knoydart. The importance of the line is to be found in the fact that it admittedly is not a commercial undertaking. It may, and doubtless will, greatly benefit the fishermen and crafters, but can hardly be expected to pay a 4 per cent. dividend. The Government is accordingly expected to guarantee interest on the bulk of the capital, and though in the favored Emerald Isle government guarantees of railways have been common enough since the beginning of railway history, a government guaranty in Great Britain is an absolute novelty.

Ireland also has one interesting bill, and one only. There are in Ulster two flourishing railway companies, the Belfast & County Down and the Belfast & Northern Counties. But the monopoly of the traffic between Ulster and Dublin is in the hands of the Great Northern, a company which, it is only fair to say after a long period of extreme and well deserved unpopularity, has done a good deal in the last few years to redeem its reputation. But for all that the Ulster spirit will not brook subjection, and accordingly the Midland Great Western comes forward with a project for extending its existing line from Kingscourt across the counties of Cavan, Monaghan, Armagh and Tyrone to a junction with the Northern Counties Railway at Cookstown, so opening up a new and independent route both to Belfast and to Derry. The length of the new line will be about 75 miles, and though the estimated cost is, according to English ideas, but small, being reckoned at some £10,000 sterling per mile, the project is on the whole the most important one of the railway year, but unless railway construction takes a fresh start very soon, there will be ere long a good many engineers' offices to let in Westminster.

I may, however, add that the opening of the Manchester Ship Canal is not the only evidence that inland navigation is beginning to command increased attention. The Thames Conservancy, the body controlling the Thames from the source to the sea, has various important schemes of reclamation and embankment on foot. The Grand Junction Canal, which comes into London from the north alongside of the London & North Western Railway, seeks power to amalgamate the undertakings of the Leicestershire and Northamptonshire Union and the Grand Union Canal companies. So, too, in Ireland, the Grand Canal Company proposes to buy up the rights over the Barrow navigation, or in other words to concentrate in one hand control of a water route right through the centre of Ireland from Dublin to Waterford. On the other hand, the South Yorkshire Navigation Company, which several years back obtained powers of compulsory purchase over the important Don navigation near Sheffield, at present the property of the Sheffield Railway Company, has apparently failed to find the necessary funds. At least Parliament is to be asked next session to grant a further extension of time for carrying out the project.

## Train Loadings for Railroad Bridges.\*

The great advance made within recent years in the matter of metallic bridge construction, and the gradual convergence of opinions toward uniformity in our practice, have led many to hope for and believe in a final solution of all the various minor points connected therewith. The writer never has accepted any such idea, and does not believe that we have reached the end of our education or development in any direction. The tendency to seek for a "final standard" in any engineering construction, regardless of changing conditions, is a harmful one. Take from the engineer the right of professional judgment, and how does he differ from an automaton? While the writer does not believe that all the disputed points in engineering practice can ever be brought to positive uniformity, we can, by fair and thoughtful discussion, approach it more and more. To do this in the most effectual manner, it will be better to limit the discussion so far as is practicable to one subject matter at a time. The one subject upon which there is more general interest than any other connected with railroad bridges is the character of the live loading to be specified and upon which there is a far greater probability of harmony than many others.

The miscellaneous collection of train diagrams now in use has grown tentatively and naturally till it has reached its present absurd condition. The first engines selected were properly the heaviest actually existing engines, with the useless refinements of all their frac-

\* Extracts from a paper by Theodore Cooper, M. Am. Soc. C. E. Read before the American Society of Civil Engineers Jan. 3, 1894.







increased during the past year. The table of prices of anthracite at tidewater shows the following:

	Broken.	Egg.	Stove.
Jan. 1.....	\$4.00	\$4.40	\$4.75
June 1.....	3.90	4.00	4.40
Dec. 18.....	3.75	4.00	4.45

Imports of coal are equal to about two per cent. of the

#### Rodger Ballast Cars.

The hopper design of car is much favored for transporting ballast and distributing it upon the track in position for track raising, and when provided with a dumping device by means of which the amount of bal-

of the rails, to flange the rails and leave them clear for regular traffic, and to distribute the bulk of the ballast at the ends of the ties where required.

The car shown in fig. 1 has an inclined bottom at the sides and ends, the hopper extending between and slightly below the inner axles of the trucks. The door,

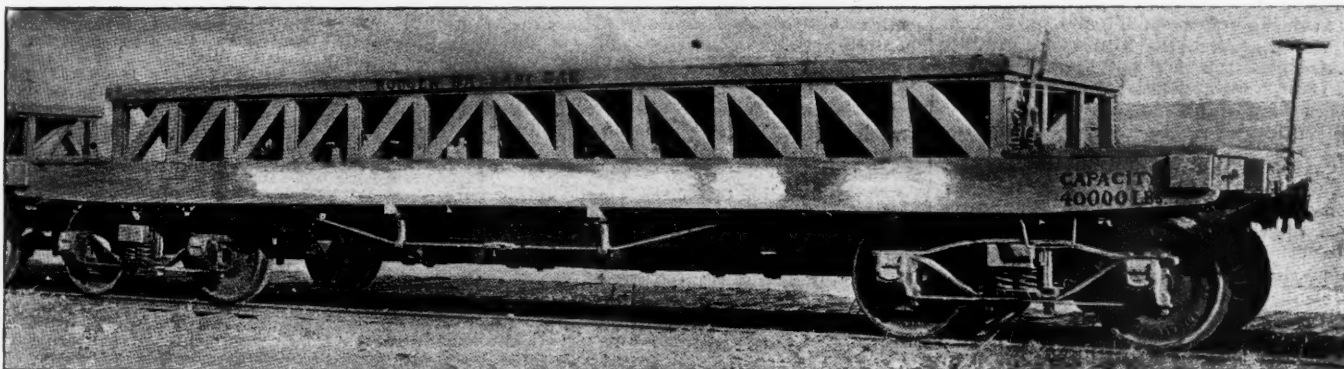


Fig. 1.—Rodger Ballast Car.

coal mined. The imports from Nova Scotia were about 30,000 tons, more than twice as much as in 1892. This is due largely to the interest of certain Boston capitalists in the mines there. The total imports of bituminous for the first 10 months of the year were 925,098 tons, about 17,000 tons less than the year before. The exports were 1,161,929 tons of anthracite and 1,884,181 tons of bituminous. The record of shipments to Canada and Mexico show large increases, in consequence of the inclusion, since May 1, of shipments

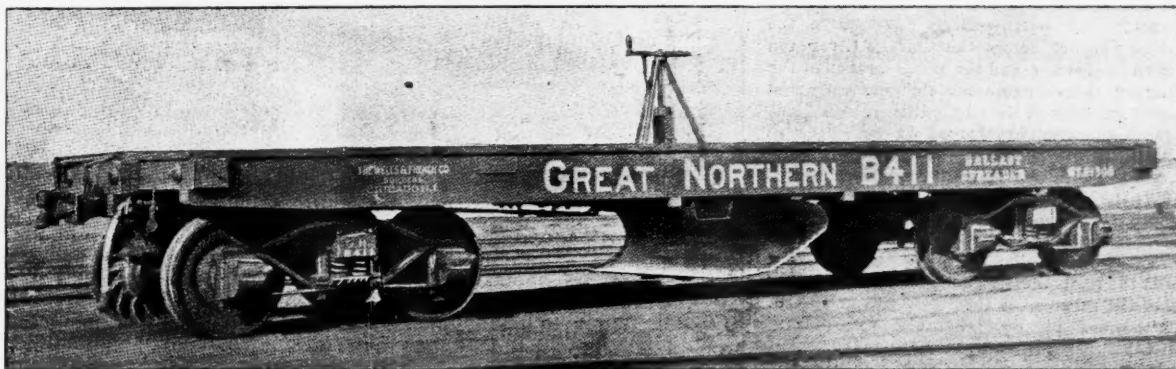


Fig. 2.—Rodger Ballast Plow.

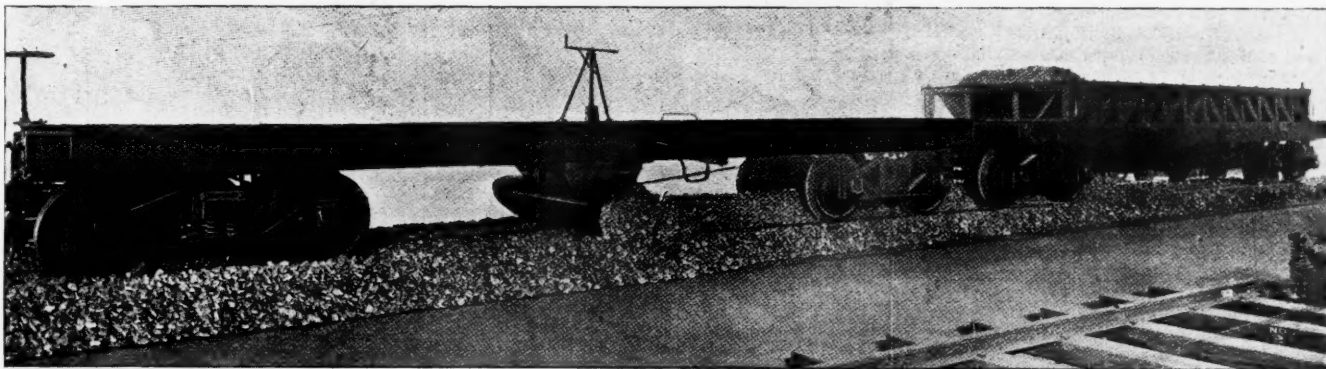


Fig. 3.—Plow at End of Train.

going by rail. Of the exports, 2,366,000 tons went to British North America, 153,000 tons to Mexico, and 273,000 tons to Cuba. Canada uses about 5,400,000 tons of coal, of which about one-third comes from Nova Scotia, and the balance mostly from this country.

Marked activity in the production of bituminous coal is noted during the past year in every state. The Beech Creek district has shipped 200,000 tons more than in 1892. The Cumberland district shows an increase of 300,000 tons; the Chesapeake & Ohio, 400,000 tons, and the Norfolk & Western, 300,000 tons. The production of coal and coke in Virginia and West Virginia is growing rapidly, and shipments are made to the West as well as to the Atlantic seaboard. Shippers of coal from Pittsburgh by river have had a very bad year owing to the long-continued drought, and the competition of shippers in the Kanawha and other districts is threatening the Pittsburgh trade all along the Ohio River.

The paragraph of this review referring to business between the Allegheny Mountains and the Missouri River is devoted chiefly to discussions about wages, the large number of mines and the varied quality of their products making competition active. Coke has suffered from the depression in iron, and the price is lower than for some years.

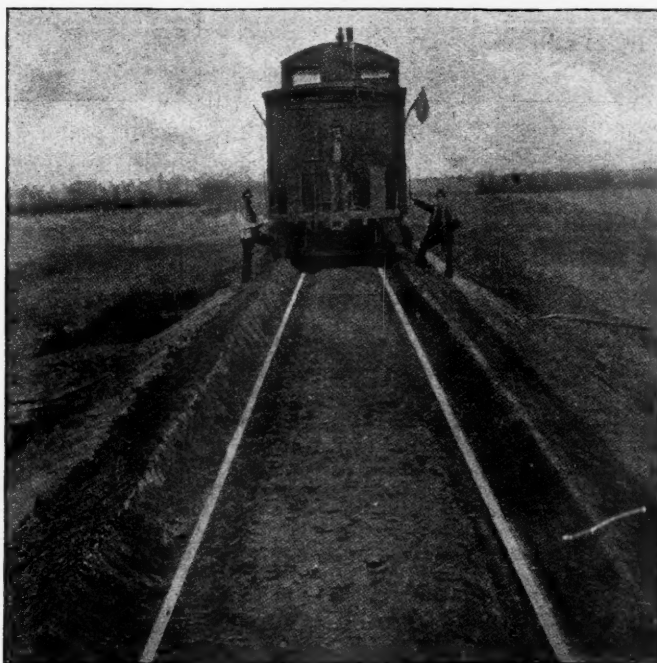


Fig. 4.—Track as Left by Plow.

last distributed may be regulated, such cars are valuable equipment for any railroad. A suitable plow should be used with such cars, to be attached at the rear of the ballast train, to level off the ballast to about the height

17 ft. in length, opens longitudinally at the bottom, the amount of opening, and hence the amount of ballast distributed, being regulated by means of a lever at the end of the car. The lever operates a shaft extending lengthwise of the car at one side of the hopper; to the shaft are attached the ends of chains. The chains extend around under the door and are fastened to the door at the opposite side. By operating the lever the shaft is revolved and the chains wound or unwound and the door closed or opened.

Some of the dimensions of this car are: Length of car, 32 ft.; width of car, 8 ft. 9 in.; height of top, above rail, 6 ft. 1½ in. Its capacity, level full, is 14,6 cu. yds., but 18 to 20 cu. yds. may be heaped onto each car. The construction is such that the car may be readily changed into a standard 30-ton flat, or into a 30-ton gondola, at a small expense.

The method of unloading is as follows: The hopper door of the forward car is opened sufficient to allow only what ballast the track will hold to run out. As the second car arrives at the end of the ridge left by the first car its hopper is opened and the filling begins at the end of the fill made by the first car; this is continued for all cars in the train. A carload of ballast usually fills the track for a distance of 70 to 90 ft. A train crew can easily unload a train of these cars in a few minutes. The car is well adapted for use in filling trestles, the handling of coal and ore upon elevated dumps and distributing cinders from division points.

The plow used with the cars described above is shown in fig. 2. The plow is attached to the rear end of the train and when it reaches the place where the first car began discharging its load, the plow is lowered to the track by means of the screw and handle seen in the cut shown. The plow in the lowest position, and following the train, leaves just enough ballast between the rails and plows the remainder to the outside of the rails and leaves it on the ends of the ties. By such distribution only a small quantity, at most, of the ballast is wasted



and the ballast intended for one track is not distributed over adjacent tracks.

Fig. 3 shows the rear car of a train unloading and the plow distributing the ballast. Fig. 4 shows the appearance of the track after the ballast train has deposited its load.

The equipment above described is made by the Rodger Ballast Car Company, Monadnock Building, Chicago, and is at present in use by the Illinois Central, Great Northern, Atchison, Topeka & Santa Fe, "Soo Line," Pittsburgh, Fort Wayne & Chicago, Pittsburgh, Cincinnati, Chicago & St. Louis and other railroads.

#### Rapid Transit in Chicago.

It seems likely that the present year will witness considerable progress in the development of rapid transit facilities in the city of Chicago. This advance will probably be mainly in the construction and extension of the various elevated lines, two of which are now in operation, another in process of construction, but which will doubtless be in operation before the year is half over, and another, the Northwestern Elevated Railroad, to which a franchise was granted last week.

The ordinance provides that the latter road shall commence at Congress street, or at a street or point north of Congress street, and between Wabash avenue on the east and Market street on the west, and extend in a northerly and northwesterly direction to the Chicago River; thence across the Chicago River at a point between Cass street and the north branch of the Chicago River; thence extending in a northerly and northwesterly direction to the city limits.

Considerable opposition to this road was developed, as it was unknown to the general public who the promoters were, and it was feared by many that the plan was engineered by the North Side cable interests, to prevent the building of the proposed north branch of the Lake Street Elevated Railroad. The promoters of the road have strenuously denied that Mr. Yerkes is in any way interested in the road, and a glance at the names of the promoters of the scheme, as they are now published, would seem to be sufficient proof that the company means business. Mayor Hopkins vetoed the ordinance as first passed and recommended that it be so amended as to require that the company shall build and have in operation, within three years, five miles of track on the main line, and to complete the main line to the city limits within ten years under penalty of \$25,000 for every mile of road not completed within that time. He also proposed adding to the clause which stipulates an annual license fee of \$50 for each car used the provision that after the expiration of ten years from the commencement of the operation of the road, it should be required to pay annually into the city treasury some percentage of its gross receipts, and recommending 1 per cent. during the second period of 10 years, 2 per cent. during the third period of 10 years, and 3 per cent. during the remainder of the 50 years for which the franchise was granted. These amendments were made and the ordinance passed. Another amendment compels the company to file plans for all routes within a year after the acceptance of the ordinance and also that the ordinance must be accepted by the company within 30 days. The backers of the road have not yet signified their intention of accepting the terms offered, but as the present need of better facilities is apparent to everyone conversant with the situation, it seems probable that such arrangements will eventually be made as to make it an object for some one to build the road. It is understood it is the intention of this company to use electricity as a motive power.

An ordinance was passed by the City Council last May authorizing the Lake Street Elevated Railroad Company to construct three branch lines and requiring the company to file a certified copy of the survey of the different routes with the Commissioner of Public Works before Jan. 1, and also that the proposed north branch be built to the city limits within three years. The necessary papers have been filed, and the company proposes within two years to give to the north division a road similar to its Lake Street line. The facilities of the company for performing the work are very good, as it has its own construction company, and can begin work without the delay that usually follows the organization of a company for this purpose. The company proposes to start its north branch from a point on Lake street and east of Fifth avenue and run in a northerly direction to the city limits.

The plans of this company for a downtown extension seem doomed to disappointment, at least for the present. So many objections were urged against the erection of its structure along Madison street as to make it clear that the consent of the owners of the necessary frontage could not be obtained. The extension of the line on West Lake street is progressing rapidly.

The West Side Metropolitan Elevated Railroad Company has all the two-track structure on its main line erected, the ties laid and a part of the rails in place. Something over half a mile of the four-track structure is up, and foundations are laid as far east as Jefferson street. Surveys for the two branch lines are completed and iron ordered for a part of the northwest branch. It is expected that the road will commence operations in the spring.

The annual meeting of the stockholders of the Chicago & South Side Rapid Transit Railroad Co., or "Alley," was held on Jan. 4. Considerable interest has been manifested in this meeting for the reason that it has been known for some time that there was an opposition to the re-election of directors favored by the Chicago City Railway interests. Messrs. Lobdell and Farwell, representing the opposition, sent out last week a letter to the stockholders of the company calling for a more vigorous policy and management and asking for proxies on the following platform: First, fast trains and more of them. Second, extension to Englewood at the earliest possible moment. Third, a downtown loop if it is possible to get one. It is thought by many that trains should be run as often as every three minutes as far south as Fifty-first street, and that only one in three of the trains should be run over the less profitable part of the road, extending from Fifty-first street to Woodlawn, at which point it seems impossible for the elevated road to compete successfully with the fast suburban train service of the Illinois Central. It is generally understood that the management of the road is in the hands of parties interested in the Chicago City Railway and believed by many

This statement shows the expenses of operation to be 55.9 per cent. of the gross receipts, and the average cost per passenger to be 2.76 cents. The maximum cost per passenger was in January, 1893, when the operating expenses amounted to 4½ per cent. of the gross receipts, or a cost per passenger of 4.73 cents. In October, 1893, the operating expenses amounted to about 35 per cent. of the gross receipts, and the cost per passenger to 1¼ cents. The report shows the division of the expenses to be as follows:

	December, 1893.	Dec. 16, 1892, to Dec. 31, 1893.
Passenger earnings.....	\$94,168	\$1,535,471
Expenses:		
Maintenance of way.....	2,460	24,221
Maintenance of rolling stock.....	2,734	55,999
Conducting transportation.....	47,347	667,753
General expenses.....	5,104	88,520
	\$57,647	\$346,495
Net earnings.....	\$36,521	\$688,976

#### Telescopic Ashes Elevator.

An ingenious machine for raising ashes, or similar material, from a basement and delivering them di-

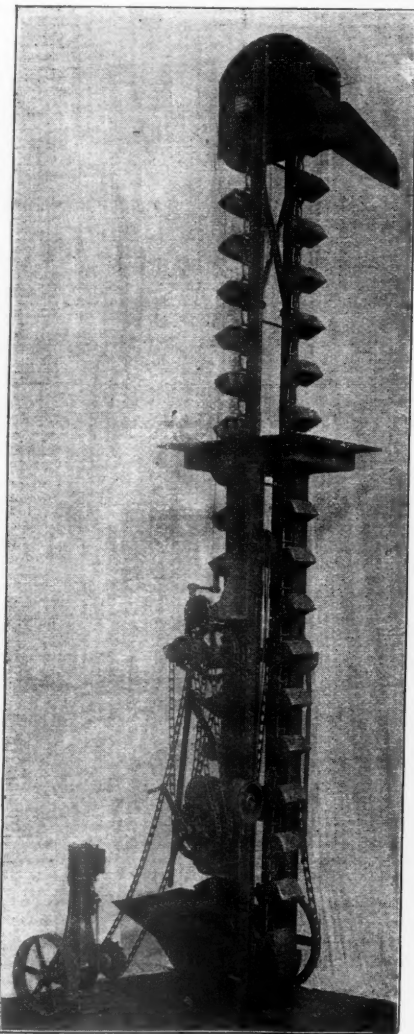


Fig. 1.

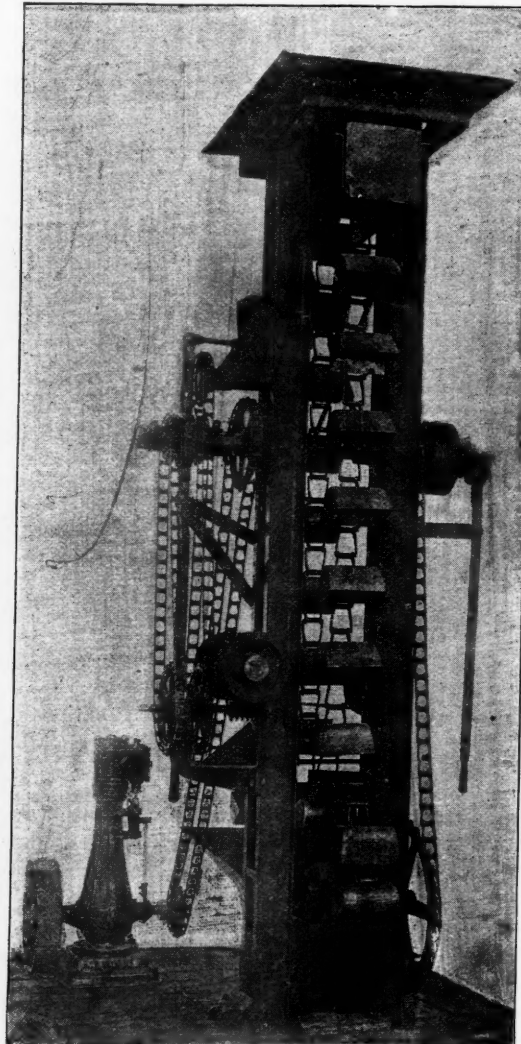


Fig. 2.

Telescopic Ashes Elevator.

rect to a wagon is shown in the two illustrations. The machine was designed specially for use in such buildings as have their own power or heating plants in the basement. It is usually erected under the sidewalk with the cast-iron frame shown at the top of fig. 2 set into the sidewalk; the opening is covered when the machine is not in use. When it is desired to elevate ashes the elevator is run up by power through the hole in the sidewalk to the proper height to discharge into a wagon, and the ashes are shoveled into the bucket at the bottom. Fig. 1 shows the device extended and ready for use; fig. 2 shows it when telescoped below the walk and covered over.

This machine is in use in many of the large buildings of Chicago. It is made by the Link Belt Machinery Company, of Chicago.

#### Steel in Car Construction.

The following is a synopsis of the paper on Steel in Car Construction, read at the December meeting of the Western Railway Club by Mr. J. D. McIlwain, of the Harvey Steel Car Co.:

The cars exhibited at the World's Fair by the royal Prussian railroads were of two classes—coal and lumber cars, both built entirely of iron and steel. As a piece of fine workmanship these Prussian cars are a success, but are too expensive in first cost. Krupp showed a pressed steel passenger car truck frame, which is in advance of the usual European practice, and may be worth the consideration of the American railway man. Next on the list are the trucks and two flat cars produced by the Fox Pressed Steel Co. These cars are constructed of pressed steel from patents controlled by that company.

	Receipts.	Expenses.	Passengers.	Expenses per pass.
				Cents.
Dec. 16, 1892.....	\$32,684	\$29,863	633,685	4.57
January, 1893.....	52,555	49,705	1,051,139	4.73
February.....	52,822	48,810	1,056,414	4.61
March.....	63,716	53,969	1,274,318	4.24
April.....	78,049	53,393	1,550,304	3.49
May.....	165,224	90,814	3,504,485	2.74
June.....	71,733	84,964	3,474,655	2.42
July.....	152,130	77,24	3,042,612	2.55
August.....	162,047	67,327	3,241,958	2.08
September.....	156,592	82,001	3,391,859	2.09
October.....	268,811	93,961	5,376,220	1.75
November.....	72,883	56,305	1,157,675	3.88
December.....	64,168	57,647	1,285,378	4.43
	\$1,533,415	\$846,495	30,702,432	Avg. 2.76



The parts, as in the Prussian cars, are riveted together, making a very strong job. The cars of the Harvey Steel Car Works, at the Fair, consisted of a box, coal and tank car, and the frames of these cars were built entirely of steel. The material for sills, needle beams, posts and braces, plates and rafters, is of a standard section. The trucks are of diamond pattern, and entirely of steel. The largest of the two gun cars of the Pennsylvania Railroad has a capacity of 285,000 lbs.; weight, empty, 175,000 lbs. Its length over all is 90 ft. 9 in.; width, 9 ft. 10 in.; height, 9 ft. 10 in. The wheel base is 80 ft. 3 in. When the car was loaded with the Krupp gun, weighing 370,000 lbs., the total load on the rails was 445,000 lbs., and the weight on each wheel 6,953 lbs. The car frames are built of steel plates. The lighter of these two monsters is built on the same principle as the larger one and rests on 24 wheels, or four six-wheel trucks. Imagine such a car built of wood. The frames of the numerous cranes and steam shovels at the Fair were of steel. But few of the wooden wrecking cranes of years ago are now in existence.

There are a number of designs in steel or iron, which were not at the Fair, which may be worthy of note. The Lake Shore & Michigan Southern has several flat cars with channel iron sills that have been in service some 15 years with good results, especially in cost for maintenance and renewals.

Probably the most extensive experiment yet made with metal frames was with cars built with iron pipe underframes, and, no doubt, the result derived from the use of these cars has retarded the advance in metal underframes.

Other metal frames designed in this country are still in their infancy. European and other foreign countries have made marked progress in metal car construction, and demonstrated to their satisfaction that the metal car is more economical than the wooden. The economy in steel cars is in the reduced cost of maintenance and renewal. The Spanish freight car is built on the four-wheel principle. The underframe is made of channel iron; the upper frame of oak, and the siding, lining and flooring of pine. The wheels have wrought iron centers, steel tires and steel axles. A more modern type of car was designed and built at Lancaster, England, by the Lancaster Railway Car Co., for the Ceylon Government. It has bogie trucks, and is not unlike the American car in general appearance. The draft and buffing arrangement is English. The four sills are 9-in. channels with 3-in. flanges. The center sills are 16 in. apart. The width of frame is 8 ft. 4 in.; length of body, 31 ft.; weight, 25,300 pounds. The trucks are of the plate type, each side being of one piece of pressed steel, with flange on outside top edge, the half elliptic springs being placed between the flange and journal boxes. The wheels have wrought iron centers, steel tires, and are 38 in. in diameter.

The Italian railroads have this year adopted the eight-wheel cars with bogie trucks, with a capacity of 30 tons. Their old standard is similar to the Spanish four-wheel cars of 12 tons capacity.

The Mexican railroads are taking to the steel frames to such an extent as to build all their new stock of steel. The Mexican cars are very similar to the American type.

From previous experience, it has been demonstrated that a steel frame car can be built that will embody 150 per cent., or two and one-half times, greater resisting strength, at least 300 per cent. longer life, cost 50 per cent. less, cost for maintenance and weigh 15 to 20 per cent. less, than the modern American wooden car. Let us analyze the figures: First, greater resistance: the strength of four 6 in. 13-lb. and two 12-in. 32-lb. I beam longitudinal sills, combined with 6-in. 15-lb. I beams for end sills, and body bolsters of 10 in. steel plates, will give a resisting strain two and one-half times greater than six 5-in. x 9-in. wooden sills as constructed in present practice. Length of life: The average life of a wooden car, on account of decay, is 12 years. A steel frame will last say 45 years, or four times longer than a wooden one. This is based on what we actually know regarding wood and by comparison in steel in bridge construction.

Maintenance: We claim a saving of 50 per cent. a moderate estimate. In steel there is no shrinkage; therefore there is no labor expended the first two or three years in taking up slack. There is no wear and very little tear in steel. When a car is 12 years old it costs more to maintain it in safe condition than it is worth, according to M. C. B. rules of depreciation. In a steel car all that requires renewal is the wooden parts, such as floor, siding and lining. Of course the wheels, axles, journal bearings and brakeshoes depreciate the same on all cars, wood or steel. Less weight: The Harvey cars on exhibition weighed as follows: Box car, 28,900 lbs.; gondola, 22,000 lbs.; tank car, 19,000 lbs.; against an average weight for wooden cars of 31,000, 26,000, 22,000 lbs., respectively. A little calculation will show what can be saved by using steel cars. The average life of a wooden freight car is 12 years. We will take the low estimate of 36 years for a steel car properly constructed. The cost per year to maintain a wooden car is estimated at \$50, or \$600 for 12 years. First cost, \$650; two renewals, \$1,300. Total, \$1,950. Add to this maintenance for 36 years at an average of \$50 a year, or \$1,800; making total principal invested \$3,750. Adding to this six per cent. compound interest, would make an outlay of \$2,151.40 for 12 years; \$6,478.39 for 24 years, and \$15,111.44 for 36 years for one wooden car. For a steel car, first cost would be \$800; maintenance at an average of \$25 per year for 36 years would be \$900; a total of \$1,700 principal invested; with six per cent. interest added, would make an outlay of \$2,027.68 for 12 years; \$4,795.54 for 24 years, and \$9,310.29 for 36 years, showing a saving in favor of the steel car of \$123.72 in 12 years; \$1,682.85 in 24 years, and \$5,834.15 in 36 years; an average of \$162.06 per year. On 1,000 cars, according to above calculation, \$162,060.80 would be saved in one year, and \$5,834,160 on 1,000 cars in 36 years, by using steel cars instead of wood.

One of the weak points in cars as at present built is the draft appliance. I am satisfied that steel center sills, including the draft arrangements, can be successfully applied to freight cars, and that steel in passenger

car construction can be more successfully used than it has been yet. The breakage of center sills over bolsters, and the continued renewal of draft timbers, would be overcome. These two items cost more for maintenance than all the rest of the car above the wheels.

If a good non-telescoping device were in use on all cars in passenger trains, the loss of life, limb and property would be reduced to a minimum. The vestibule has done much toward preventing this evil. The writer believes that the coming car will be built on radically different lines from the present. The principal change will be in the end. Instead of the platforms, draft timbers and vestibules being separated from the car frames proper, they will and should be one and the same.

An outline of what I would call an ideal passenger car frame that would make telescoping and crushing in of ends and sides a thing of the past is as follows: Use two 12 in. I beams, about 32 lbs. per foot, for center sills, and six 8 in. 18-lb. I beams for side and intermediate sills; two 8 in. 20 lbs. per foot, I beams for end sills. The center sills to project below the end sills, say, 6 in., to permit the draw-bar passing between the center sills. The draft stops should be placed the same as in freight cars. Make the side plates of 6 in. I beams 13 lbs. to the foot, the end plates of 6 in. I beams, 16 lbs. to the foot, with eight 3 x 4 in. angles for corner and end posts, with 1/2 x 3 in. plate for end brace. Such construction would reduce the liability of wrecks to a minimum. The day is not far distant when you will not only see steel center sills, but complete steel frames for both passenger and freight cars. For the former as a matter of safety, strength, long life and economy; for the latter as a matter of economy in cost for maintenance and dead weight. That the cost of repairs will be greater with steel than with wooden frames is a question open for argument.

As to its being necessary to have special machinery to repair steel cars, every well-appointed railroad locomotive and car shop is equipped with punches, shears, cold saws, bulldozers, etc., and that is about all that is

ered independent of the other by means of screw and handwheel, and the sides are gibbed to the main column so as to take up all lost motion. The two side-heads, with their spindles and hangers, travel back and forth with the main heads and can be disconnected at will. They are arranged to fall down out of the way below the line of the main bed, and these changes can be made in a very few minutes. Suitable fences are provided on the top of the framework, and improved clamping devices are also furnished, locking the timber to the permanent slides. The hold-down clamps are made on an improved plan and are adjustable in height and reach, and for each table. Gaining heads may be substituted quickly in order to do gaining, and the timber can be fed back and forth to any desired position for tenoning and gaining without removing the timber or turning it around. The pulleys are 18 in. x 8 1/2 in. face and make 700 revolutions per minute.

#### New York Canals.

In his annual message to the legislature the Governor of New York devotes a good deal of space to the discussion of the state canals. The total tonnage carried on all the canals was 4,331,963, which is an increase of 49,968 tons over the traffic of 1892. The Erie Canal had 256,894 tons increase, while the Champlain Canal fell off 172,174 tons, due to the diminished shipments of iron ore, lumber and coal.

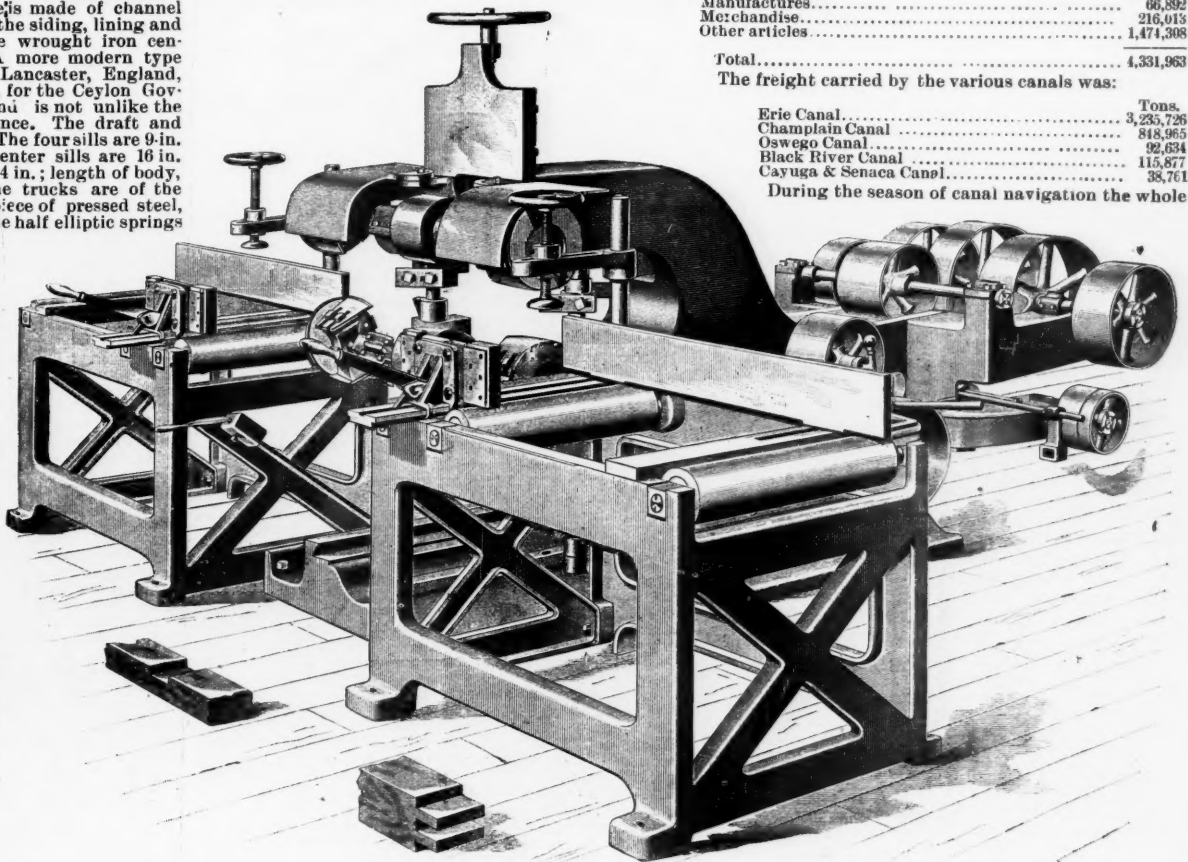
The total tonnage on the canals was:

	Tons.
Products of the forest.....	1,050,694
Products of agriculture.....	1,544,146
Manufactures.....	66,892
Merchandise.....	216,013
Other articles.....	1,474,308
Total.....	4,331,963

The freight carried by the various canals was:

	Tons.
Erie Canal.....	3,235,726
Champlain Canal.....	848,965
Oswego Canal.....	92,634
Black River Canal.....	115,877
Cayuga & Seneca Canal.....	38,761

During the season of canal navigation the whole



New, Double, Car Tenoner and Gainer.

needed to frame and form material for renewals and repairs of steel parts. If standard sections are used, very little forging will be necessary. If put together on car building lines and not like a boiler, it will be as easy to remove and repair bent or defective parts as in a wooden car.

Finally, the question of the success of metal cars in this country depends largely on the disposition of our railroad managers and car owners to pay 20 per cent. more for new equipment that will reduce the present cost of operation and maintenance 50 to 75 per cent.

#### New Double Car-Tenoner and Gainer.

Herewith is a cut of a new combined car tenoner and gainer manufactured by the J. A. Fay & Egan Company of Cincinnati, O. This machine is specially designed for car, bridge and mining work, and is designed for rapid and accurate work. It will cut single and double tenons on one or both ends of large car sills, which obviates the necessity of turning the timber around. The manufacturers claim that the strength, durability and adjustments of this machine are unexcelled.

It will cut a single tenon 12 in. long, or a double tenon 5 1/2 in. in length, and will tenon or gain to a depth of 14 in. and a width of 20 in.

The machine consists of a column cast in one piece and cored out. The top surface is planed to receive the long slide, which works back and forth and carries the two sideheads and the main mandrel. The frame is of ample proportion, bolted to the main base plate, so that the machine is self-contained in every respect.

The cutterheads are on each end of the mandrels outside of the boxes, similar to the ordinary tenoning machine, and both upper and lower mandrels are belted between boxes. Each mandrel can be raised and low-

number of bushels of grain received at port of New York was 108,962,706, of which the canals carried 43,076,900, or slightly over 39 1/2 per cent. In 1892 the canals carried only 23 per cent., or 16 1/4 per cent. less. The increase is because of higher railroad freight rates, which turned more traffic to the canals.

The cost of superintendence, ordinary repairs and maintenance of the canals during the last fiscal year was \$726,087.47. This is the lowest expenditure for these purposes in seven years. In addition, the last legislature appropriated \$780,000 for improvements, consisting of lock-lengthening, deepening the Champlain Canal, bottoming out the Erie Canal, improving the Erie Basin and Black Rock Harbor, dredging the Albany basin, improving the Erie Canal in the city of Buffalo, repairing the upper and lower Mohawk aqueducts and the Schoharie Creek aqueduct, rebuilding the state dam at Cohoes, improving certain feeders and reservoirs, building canal walls and bridges, etc.

The Governor refers to the activity of Canada in competing for the traffic of the great lakes. He mentions the new canal at Sault Ste. Marie and the 14 ft. way from Lake Superior through the Welland Canal and the St. Lawrence River to the sea. When this is completed a 2,000-ton boat can go from Duluth to Montreal, Halifax or Liverpool. To meet this competition the U. S. Government is making a 20-ft. channel through the lakes to Buffalo and when it is completed a 3,000-ton boat can go east as far as Buffalo, and hence the necessity of improving the Erie Canal and utilizing its change. The Governor's plan for increasing the tonnage of the Erie Canal is by a speedier and more economical motive power for canal boats, and, as every one knows,



he believes electricity will effect a considerable saving in cost and a considerable increase in speed.

State Engineer Schenck, in his report on the needs of the canals, advises the rebuilding of 10 locks on the Black River Canal immediately at a cost of \$160,000 or else that the canal be abandoned. He recommends that the dam across the Hudson at Troy be put in repair and that hereafter money be appropriated to make necessary repairs when required. He does not think it advisable to build a new stone dam at that point, which would cost over \$500,000. The work of widening and deepening the Champlain Canal along its entire length he estimates at \$1,000,000, and reports that the improvements already made cannot be utilized until the whole canal is so improved. He therefore recommends that this improvement be abandoned temporarily or that an annual appropriation of \$250,000 be made for three or four years to complete it. He wants a \$35,000 stone wall at Schenectady to prevent breaks there and 10½ miles of old bench walls on the Middle Division of the Erie to be replaced at a cost of \$152,000; \$30,000 are wanted for the Black Rock harbor and Erie basin at Buffalo.

Mr. Schenck deprecates the idea of the Federal Government having control of the Erie Canal in the event of its being made a ship canal, and is much in sympathy with what is known as the Seymour plan, by which it is proposed to deepen the canal to a depth of 9 ft. of water by raising the banks 1 ft. and by excavating the bottom 1 ft., except through locks and over aqueducts. He submits a plan for enlarging the canal and making it 100 ft. in width and 12 ft. deep to carry barges 250 ft. in length and 25 ft. wide with 10 ft. draught of water. The cost he estimates at about \$25,000,000, and he recommends that a commission be appointed to look into the matter and to report to the legislature as early as is practicable.

With reference to the electric-trolley system he says that the main question is purely an economic one, and the success or failure of the investigation now in progress will be decided on that ground. The electric system must compete with the steam propellers, and to do this they must supply power as cheaply as can be done by steam. The following appropriations are recommended:

For lengthening lock No. 20, \$38,000; for building new canal at Newark and substituting two locks for three, \$300,000; for improving the prism of the Oswego Canal and repairs to Battle Island dam and Phoenix dam, \$50,000; for survey of the Erie Canal, \$25,000.

#### Byers' Rail Unloader.

Herewith are illustrations of a simple and practicable device for unloading and distributing rails along the track. It consists of three brackets, hooked onto or otherwise attached to the side of a gondola or flat car, each of which carries a roller. The lengths of these brackets vary up to 14 in., or of such a length that when

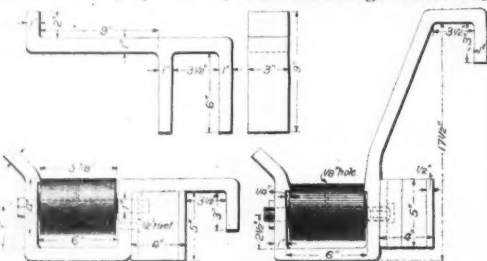


Fig. 1—Byers' Rail Unloader.

placed so that the rollers are in an inclined plane the rail will gently slide down the side of the car. Fig. 1 shows these brackets, all of which are made of 1 in. x 3 in. bar iron. The bearings of the rollers are provided with ducts for oiling.

The attachment renders it possible to distribute rails along a track while the car is in motion. A rail is first lifted up onto the edge of the car side, and is placed on the rollers to discharge itself as the car moves along.

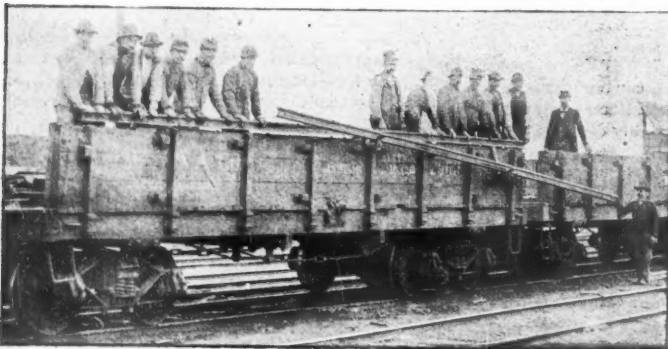


Fig. 2.

being moved by its own gravity. The device obviates the necessity of trucking rails and the expense and danger of distributing them by means of hand cars, and it saves the rails from injury such as is suffered when they are unloaded in piles.

The device can be placed on any car in a train at a

moment's notice and arranged to unload in whichever direction the train is moving.

The device was invented and patented by H. W. Byers, Engineer of Maintenance of Way, Pennsylvania Railroad, and has been in use on that road for two years.

#### Locomotive Draft Appliances at the World's Fair.

In our issue of Dec. 29, 1893, there was given a synopsis of the paper read at the November meeting of the Western Railway Club by Mr. Willis C. Squire on Locomotive Draft Appliances, at the World's Fair. The following is a synopsis of the discussion of the paper at the December meeting.

Mr. GIBBS: There is a certain arrangement of front end which is best for a given service, but all others are not bad; probably each road has for years experimented with the draft arrangements which are its standard, and made changes until it has a fairly satisfactory arrangement for each class of service, fuel, etc. Probably no arrangement can be made standard for the country, or even for a small section of the country. The two main principles are to obtain the requisite steaming capacity and the maximum fuel economy. The former must always be obtained even though at the expense of the latter. Any one of a dozen important conditions has an enormous effect upon the efficiency of the device; by changing any one of these the steaming capacity of the locomotive is improved or injured. We have settled upon a design which will suit our fuel and service, but that might not be a reliable guide for others. Some years ago I started to figure out the best possible arrangement of draft appliance for locomotives, and I think it took me three or four months to come to the conclusion that I knew less than when I began, and this, too, was very little. The best way of getting at the broad principles underlying the matter is in a shop test. I would go into a shop test only with full knowledge of the practical conditions which have to be met and with full knowledge of the limitations to such test. It certainly would be easy to limit some road variables by such a test, which would be continued for any set of standard conditions.

Mr. WHYTE: Locomotive shop tests made by the B. & O. show that with taper stacks of same height and from 12 to 18 in. in diameter the greatest vacuum is produced with the lowest exhaust nozzle within the limits possible in the tests. With straight stacks the opposite effect is produced by changing the height of the exhaust pipe. With 16½ in. straight stack less variation is produced by changing height of exhaust pipe, showing that with straight stack the height of exhaust pipe is not so definitely fixed. It was shown also that if a lining is used in the stack there should be a practically airtight joint between the two to prevent currents of air passing down between them.

The locomotive used was an American type, four-wheel connected. The exhaust pipe was telescopic, and easily raised and lowered from the outside of the smokebox. The engine worked against the airbrakes applied to the driving wheels.

Mr. SQUIRE: Fig. 27 A on page 71 of the Proceedings is the diagram of a boiler designed by Mr. Higginson, of the C. B. & Q. R. R., in 1877 or 1879, and by Mr. Stevens, of the Central Pacific, in 1883. Webb designed a similar one in 1891, as shown on page 72. The first one was designed by Milholland in 1855. Neither one of these designers knew of the designs of the other.

Mr. QUEREAN: Draft arrangements which work successfully on one road will not necessarily be successful on others. Two or three years ago one of our Class M engines was fitted with draft appliance similar to that used on the Hanover State Railway. It was found that, with the size of nozzle called for, the engine would not steam properly, even in suburban service. The exhaust nozzle was high, reaching almost to the base of the stack, and I think there was no baffle plate in the front end. By reducing the diameter of the nozzle the engine would make steam fairly well in suburban service, where there were frequent stops. We tested the engine on one of our fast passenger trains, No. 1. The best firemen on the road were put on the engine, and they had great difficulty in making the engine steam; it could not haul No. 1 satisfactorily. The German arrangement was removed, and the following changes were made: Using a smaller stack, putting in a baffle plate, lowering the exhaust nozzle; there was no lack of steam at any time after. The arrangement recommended by Herr von Borries probably worked satisfactorily in Germany, but it would not work satisfactorily under the conditions on the C. B. & Q. Ry. Recently I was riding on an Empire State Express engine; it was not steaming well at first, and the fireman raised the diaphragm a little with very good results.

I know of no better way to reach a proper solution than by a shop test. If an engine does not steam well it is American practice to reduce the size of the exhaust tip at the expense of the power of the engine, and the coal pile. The adjustable diaphragm on the New York Central engine works well, and has the added merit that it can be adjusted almost instantaneously while the engine is in motion.

The Buchanan water table gives no trouble as far as steaming is concerned; it seems a good thing, but the water tables are to be removed as fast as the engines go through the shop, and brick arches are to be put in their places. It is very difficult to do any work on the back flue sheet, unless the workman gets in above the water table, and to do this it is necessary to cool down the engine.

We are arranging some experiments on the C. B. & Q. We plan to put a number of holes about 1½ of an inch in diameter in the smoke stack in a vertical row, and fit them with plugs. By removing several of these plugs in succession when the engine is at work we hope to locate approximately the point in the stack where the exhaust first fills it, by means of the jets of steam or smoke which will come through the holes. Then we will so locate the height of the exhaust nozzle that the exhaust will fill the stack at or near the base. The final adjustments will be made with an exhaust gage. We also propose to determine the best diameter for the stack by using an adjustable liner.

It seems to me that the action of the exhaust must be twofold. While in the smoke arch it must act like an injector, and the lower the exhaust tips the longer the distance the exhaust must travel while in the arch and the stronger the draft it will produce. As soon as the exhaust strikes the stack it must act as a pump, the stack being the cylinder and the steam the piston, and to be most efficient the exhaust should fill the stack from the base to the top. For these reasons the center line of the exhaust tip should be the center line of the stack. In other words, a double exhaust nozzle would not be as efficient as a single. It is known that in blowers which use steam directly for producing a draft, the most efficient form is that in which the steam issues in a number of comparatively small jets. The form in which the steam issues in the shape of a circular ring is not quite as efficient, but is more economical than when it escapes in a solid column.

Mr. JOHANN: The Alton road received some engines about 15 years ago which were fitted with an adjustable baffle plate, and there was so much difference in the way the engineers and firemen operated it, that after investigation we fastened the diaphragm where the best results were obtained, and took the machinery for moving it away. We have had no trouble since.

Mr. MACKENZIE: Some five or six years ago we introduced the movable diaphragm. The instructions were to always, in leaving stations, or when putting on coal, lower the diaphragm until the green coal had properly coked; we found that the boys were in the habit of leaving the diaphragm where the engine would steam best and after a while it could not be moved. While the diaphragm was manipulated properly, we had some excellent results. The diaphragms would, however, soon become clogged up with cinders and so we fastened them.

Mr. MARSHALL: I understand that this diaphragm is really equivalent to a variable nozzle. It shows that we can have on the locomotive something which will produce that effect without introducing complicated apparatus that is liable to get out of order. It can be regulated for different kinds of fuel, and I should think that it would be a good appliance.

Mr. JOHANN: Where an engineer uses it intelligently, the movable diaphragm is a good thing.

Mr. MARSHALL: It seems to me that the variable diaphragm is in some respects better than the variable nozzle. The diaphragm can certainly be made in a way that will avoid trouble from sticking, then we have only to see that the engine men use it properly.

Mr. PECK: I found that where a movable diaphragm was used the enginemens would place it where the engine would steam the easiest, and then the engine would throw fire, so I moved the diaphragms to where they wouldn't throw fire and fastened them there. I have changed almost all of the engines and placed the diaphragm plate ahead of the nozzle. A solid sheet extends from the flue sheet out even with the top of the nozzle, and those engines throw less fire and carry less weight on the front end. The cinders are probably broken up and thrown out.

Mr. GIBBS: On one of our engines we tried a register damper regulator in the stack. This device is not liable to stick and does not affect the burning of the fire in the firebox. If you raise or lower the diaphragm you are apt to burn the fire unequally. The engine crews would not use it and we took it off.

Mr. MACKENZIE: I think the movable diaphragm is a good thing if we can get it used. Where we have had engines run by a single man or a single crew, we found quite a saving in fuel. There is also a saving in wear of the valve motion, the packing, etc., caused by the fact that less cinders are drawn into the smokebox. By throwing this diaphragm down over the flues when the green coal is admitted, the fire is coked and a great many cinders that otherwise would come through the flues are burned.

Mr. RHODES: What Mr. Quereau says about the water leg of engine 999 is simply enginemens' talk. The water leg in the firebox is not new. The C. B. & Q. road at one time had every engine equipped with the water leg, but they have been abandoned. These water legs were abandoned, because tests made on the road showed conclusively that the arch brick was a better device in the engine for all purposes. It looks as though history was about to repeat itself on the New York Central in the matter of water legs.

Engines are built to haul trains, and in any investigation of this kind the fuel that is used on the road, and the character of the water used in the boilers, should be considered. The master mechanics and their foremen, and not the superintendent of motive power and mechanical engineer, are to be blamed for these various devices shown in this paper. Our Western soft coal burners probably would not make steam with the hard coal dust burned by the Reading engines. Some of the soft coal we use in some of these engines is just as different to what our neighbors are using as fine hard coal is to what we call good soft coal. The Baldwin engine which was tried here some time ago steamed very freely with Eastern coal, but even a change in draft arrangement did not make it steam freely with the Western coal, because it was not designed to use the kind of coal we use on our road. An investigation of our coal made in our laboratory showed that 33 per cent. of it was ash, which would be about equivalent to two parts coal and one part rock. Now, when an engine has to carry 160 or 180 lbs. pressure with that kind of coal it is no wonder that the master mechanics have to get up devices that may look strange on paper. While believing in a general way that there is hardly occasion for such a variety of front ends, I think that if we attempt to get up an appliance on a line east, and apply it on a line west, we may make mistakes. We ought to know, in a case of this kind, the character of the fuel and the character of the water. A device like this water leg becomes quite impracticable on engines where the water conditions are adverse.

SECRETARY STREET: I asked Mr. De Moulin, the engineer in charge of the French engines, the reason for leaving the locomotive front end so entirely clear. He said: "We must leave it that way in order to brush the flues. We have to brush the flues at the end of every trip." It would indicate that the draft on the fire was so very light that the flues became clogged up. The coal used in these engines, as I understood him, is a mixture of briquets and slack, which has a good deal of dust and dirt in it, and this dust and dirt lodges in the flues to such an extent that they have to be brushed out at the end of every trip.

The English fireman who fired the Queen Empress from Chicago to New York said the box filled with a fine dust; there were no cinders in it, but it was literally filled with a fine dust which he could not get out, and, do his best, he could not keep the steam up. The engine is a three-cylinder compound, and the exhaust was very mild and would not carry this dirt out of the firebox. It seems from this that there are advantages



as well as disadvantages in the sharp blast. If we use a soft blast and cannot get the dust and dirt out of the firebox in that way, we may have to remove it in other ways equally if not more expensive.

Mr. MARSHALL: The relation between the grate area and flue opening is probably not a vital one, because there may be a certain minimum flue area which is necessary for the burning of a certain amount of coal, but if for a certain amount of heating surface you exceed that, it does not make much difference.

President FORSYTH: It is evident that a draft appliance which is built on correct principles will burn poor coal better than one which is not built on correct principles. The development of stacks in this country seems to have been something like this: We used to have all diamond stalks, and the object of the large diamond on the top there was to get a large netting so as to get the gas through and keep out the cinders. Then, up in New England, the extension front suddenly broke out, and the netting was then removed from the diamond part and put down into the smoke-box, and the smoke-box was extended. The plan spread, until diamond stacks are almost obsolete, and we have straight stacks almost universally. We are now in that stage where both straight stacks and choke stacks are used. I contend that the choke stack, or taper stack, is the best shape. When engineers make a steam blast for a stationary boiler they shape the pipe like a trumpet at the bottom end and flare it out at the upper part. The taper stack will replace the straight cylindric stack until the taper stack becomes the prevailing practice in this country, as it is in most foreign countries. The use of the taper stack on the C. B. & Q. has been very successful. The C. B. & Q. engine has a stack 13 in. in diameter. We have used that diameter on 19 x 24 engines, and have used it on 20 x 24 consolidation engines, and where the engines are used for moderate speeds and the cut-off is not long a 13-in. stack can be used on the latter engine; but where working on grades and a large volume of steam is thrown out, it is found to choke up a little, and we then use stacks with a minimum diameter of 14 in.

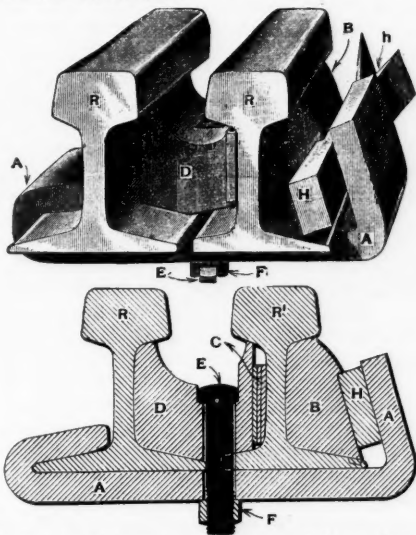
The shape of the lower end of the stack should be more flaring. A better shape is shown on the Webb engine, a short stack extending down into the smoke-box with a large trumpet shape.

The relation between the grate and the flue opening in cases like the Wooten firebox, is not a vital one, because the flue opening is for the passage of a certain amount of gas at a certain velocity, and with a large grate there is not much more coal burned or more gas produced than there is with a smaller grate doing the same work.

Mr. QUEREAU: The Pennsylvania road has made some experiments in which it took data obtained from a German work; they are not at all what are needed here. The Pennsylvania has tried the French practice very closely as to size of flue openings, grate area, length of stack. It has taken the whole thing from one end to the other and worked it through. It is now starting out on some original investigations.

#### The "Standard" Guard-Rail Fastener.

We show a perspective view and a cross-section of what is called the "Standard guard-rail fastener." This is in use on the Pennsylvania Railroad, and formed a part of the section of track exhibited by that road at the World's Fair.



Briefly, the fastener consists of a distance block or filler D, which may be adjusted to any width by gage plates C, a bolt E, passed through a notch cut in the guard rail R', an outside filler B, and a key H, which, when driven home, wedges all together. The wedge H is prevented from getting loose by splitting the end h. The instructions are to spike the outside of both rails on each tie, but to put in no spikes between the two rails.

#### Engine-Truck Side Bearing—New York Central & Hudson River.

There were but few exhibits at the World's Fair that attracted more attention from both railroad men and the general public than engine No. 999, which was exhibited by the New York Central & Hudson River. All had heard of the great speed, 112 miles an hour, attained by this locomotive, and all wished to see it; the layman took a general look that he might say he had seen the engine, but the railroad man examined well the details. Through the kindness of Mr. William Buchanan, Superintendent of Motive Power and Rolling Stock, we are permitted to show, with this, drawings of the engine-truck side bearing used by this road on engines in the fast passenger and express service.

The location of the side bearing on the truck frame and its general design are shown in fig. 1, and the de-

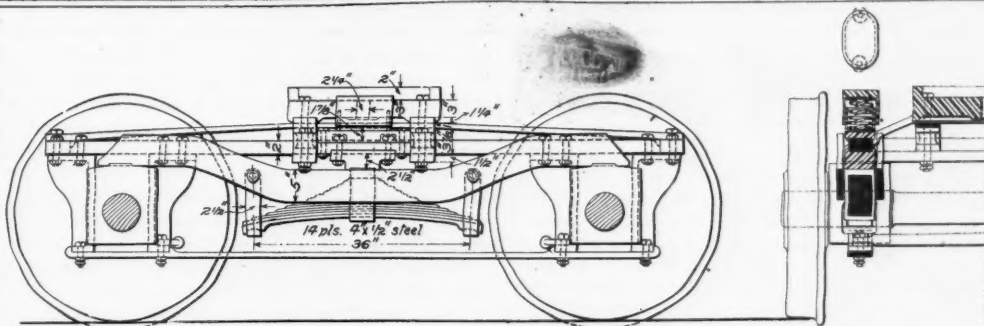


Fig. 1.—Engine Truck Showing Side Bearing, Class I Engine—New York Central & Hudson River R. R.

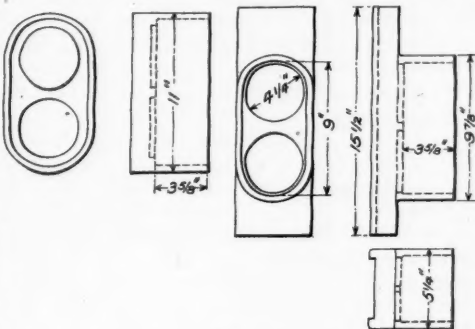


Fig. 2.

tails of the spring pocket and cover are shown in fig. 2. There are two double-coil springs used in each pocket. The bars from which they are made are 3/4 in. and 1/2 in. in diameter, and the outside diameter of the inside coil is 2 3/4 in. and of the outside coil 4 in. The free height of each is 6 1/4 in.

Referring to fig. 1, the side members of the truck frame are made in the form of trusses, the lower and tension piece of each being 4 in. wide and 2 in. thick, and the upper and compression piece 4 in. wide and 1 in. thick. The spring pocket sets on top of and flanges over the top piece as shown. This location brings the side bearing directly under the engine frame. This side bearing is not designed to carry any of the weight of the boiler, but rather to limit the rocking of the engine.

#### Pollock Patent Brakeshoe.

The Pollock brakeshoe is shown in the engraving. The body is cast iron with pieces of wrought iron cast in it extending through from face to back. In addition to the advantages claimed for other shoes, for the combination of wrought and cast iron, the patentee claims other special features for this shoe. The wrought iron pieces being inserted endwise and extending through, the full benefit is derived until the shoe is worn out. That the pieces become loose the manufacturers deny and they exhibit samples worn down to three-eighths of an inch with the pins intact. Sufficient wrought iron is introduced to give the necessary grip on the wheels, and for it to rub off and be distributed over the face of the shoe, thereby increasing its holding properties. It is claimed that the shoe will outwear four ordinary shoes.

The manufacturers put the economy as follows: It costs on an average four cents to replace a worn-out brakeshoe, and if a Pollock brakeshoe will outwear four ordinary shoes, there is a saving of 12 cents for every Pollock shoe applied, not mentioning the delays attendant on the work. Four or eight shoes would make it 48 or 96 cents per car. That the Pollock shoe will outwear four ordinary shoes the Union Iron Company, of Selma, Ala., the manufacturers, are ready to demonstrate. Numerous letters from railroad companies attest the satisfactory results of the shoes, and some tests in which these shoes and other shoes have been put under the same car are reported, which are not given here for obvious reasons, the tests being private. In two of these tests the shoes stood 16,478 and 14,378 miles of wear, without having been worn out.

#### Railroad Matters in Chicago.

Freight Traffic.—The opening week of the new year was not cheerful for railroad managers. Even the grain traffic of the Western roads centering here underwent a marked shrinkage, the aggregate deliveries at Chicago by the 11 leading lines being 4,125,000 tons compared with 5,298,000 the closing week in December; 4,622,000 tons the week ending Jan. 7, 1893, and 2,634,000 the corresponding period in 1892. The decrease from last year was entirely due to the small movement of wheat, which as stated in recent letters is a pronounced factor in lessening the earnings of lines from Minnesota and the Dakotas. Interviews with railroad managers and grain receivers indicate a further decrease in grain traffic the remainder of the month. Hence, seems likely that

freight earnings will show a further shrinkage, as there is no prospect of an increased movement of other classes of freight.

The outward movement of freight to the interior is also small, and although merchants speak a little more hopefully they do not predict a material improvement until the spring. Indications point to another overhauling of expense accounts and a more vigorous application of the pruning knife than has yet been undertaken. Referring to the subject a general manager said: "We have been meeting and discussing the wages and other items where expenses can be reduced to conform to earnings, but have done little beyond talk. But further action is necessary, and if the sentiments expressed at the meetings of the General Managers' Association the past week are an index of the determination of the head officers, effective steps to curtail expenses will not be much longer delayed."

Passenger Traffic.—The passenger business shows little if any improvement; and if the returns of some of the big lines are an index of the holiday travel it was exceedingly disappointing and fell materially below that of the corresponding time in 1892 and '93. A general passenger agent said: "Business does not show much improvement, but we are trying very hard to make the most out of what there is by working to maintain rates, and despite more or less friction in certain quarters we are meeting with fair success, the chief trouble being with transcontinental rates at one end, and the Eastern trunk lines from Chicago at the other. The former is the most difficult to control because of the antagonistic position of the Canadian roads, which have for months pursued a rule or ruin policy, and will persist in its maintenance unless they are virtually allowed to dictate terms of peace. The situation is also complicated by the fact that the American lines, including the Union Pacific, Atchison, Topeka & Santa Fe and Northern Pacific, being in the hands of receivers, are not under the restraints that are supposed to materially control the actions of lines that are trying to earn dividend. Hence the first mentioned systems are liable at any time to inaugurate a rate war and extend it in directions where peace and full rates could and would be maintained if the managers of the solvent lines were allowed to control."

The officers of the Burlington system state that the completion of the Mississippi bridge at Alton and their own bridge over the Missouri at Bellefontaine will give them superior facilities, and they anticipate material advantages from their new passenger line between this city and St. Louis.

The deliveries of grain at Chicago by the 11 leading Western roads for the week ending Jan. 6 and the same time the three preceding years compare as follows:

	1894.	1893.	1892.	1891.
	Grain.	Grain.	Grain.	Grain.
N. W.	Bush.	Bush.	Bush.	Bush.
Ill. Cent.	1,148,000	801,000	407,000	325,000
C. & N. W.	493,000	619,000	208,000	270,000
C. & R. I. & P.	558,000	451,000	194,000	92,000
C. B. & Q.	897,000	1,082,000	710,000	449,000
C. & Alton	47,000	128,000	105,000	19,000
C. & E. Ill.	91,000	201,000	45,000	82,000
C. & M. & St. P.	440,000	602,000	626,000	421,000
Wabash	72,000	80,000	39,000	159,000
C. & Gr. W.	169,000	330,000	156,000	164,000
A. T. & S. Fe.	192,000	321,000	105,000	57,000
L. N. A. & C.	3,000	1,000	1,000	1,000
Totals	4,110,000	4,821,000	2,596,000	1,730,000

The deliveries of flour by the 11 leading Western roads at Chicago for the week ending Jan. 6 and the same time the three preceding years compare as follows:

	1894.	1893.	1892.	1891.
	Flour.	Flour.	Flour.	Flour.
N. W.	Bbls.	Bbls.	Bbls.	Bbls.
Ill. Cent.	28,041	32,037	74,379	25,375
C. & N. W.	1,350	150	...	...
C. & R. I. & P.	55,100	5,850	1,625	2,130
C. B. & Q.	13,850	7,392	34,665	32,720
C. & Alton	6,750	1,375	2,900	800
C. & E. Ill.	450	150	...	...
C. & M. & St. P.	26,500	21,900	33,500	34,191
Wabash	450	2,900	625	120
C. & Gr. W.	21,735	17,144	12,584	...
A. T. & S. Fe.	...	30	210	124
L. N. A. & C.	...	...	...	0
Totals	151,276	88,568	157,668	95,271

The receipts of grain by cars in Chicago by the lead-

[Continued on page 29.]





ESTABLISHED IN APRIL, 1856.  
Published Every Friday,  
At 73 Broadway, New York.

#### EDITORIAL ANNOUNCEMENTS

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

In the last issue of the *Railroad Gazette* there appeared on page 12 tables of changes in prices of railroad bonds for various roads in several groups. The groups were "Roads in hands of receivers," "Grangers," "Trunk Lines," etc. By a series of faults beginning with the preparation of the "copy" and ending with the last reading of the proof all these groups were included under the one head of roads in the hands of receivers. Probably a dozen people at most were misled, for everyone knows that the C. B. & Q., the Rock Island, the Pennsylvania and the New York Central are not in or near receiverships; but the editors have suffered mortification and humiliation enough to make them look kindly for at least two weeks on the mistakes of Moses and other worthy people.

Mr. Carnegie's solicitude for his workmen as shown in recent letters and interviews is admirable, but it does not seem to extend to other folk's workmen. He is said to have instructed his agents to take every order regardless of price. While such a policy may benefit his workmen and keep his mills in operation, what are the other mills and their workmen to do? And why should the same policy not be extended to the rail trade? Only very recently Mr. Carnegie was a strong figure in the association of rail makers to maintain the price of rails. Plate and shape mills exist by the score, while the rail mills now number practically five; two having been closed for a consideration. Mr. Carnegie is making rails at a probable cost of \$17.50, and selling them for \$24, and his allotment for 1894 is estimated to yield a profit of one and one-half millions. It is unfortunate that railroads which have to buy rails have not the low prices offered in shapes and plates; but their opportunity came in December, when rails sold as low as \$20 a ton. Perhaps now Mr. Carnegie will extend his philanthropy to the poor railroads and their workmen. The fact is that the capacity of the plate and shape mills is far in excess of the demand; the mills are too numerous to bring into a combination, and it must be a question of the survival of the fittest. The last action of Mr. Carnegie has destroyed all hopes of any recovery in prices of other steel products than rails. The manufacturers appreciate its full meaning, and unless there is a decided and unlooked-for improvement in trade, the number of mills making plates and shapes will be less at the end of the year than now.

There has been, since the inception of the plan which resulted in the Chicago main drainage canal now building, considerable fear among residents along the route of the canal and on the Illinois River as to the purity of their water supply in case the sewage of Chicago is drained off through that river and into the Mississippi River. For this reason numerous protests have been made against building the canal, but so far as we know the city of St. Louis is the first to make an intelligent investigation of the matter. The recent report from

the city chemist leads to the conclusion that the drainage from the Illinois River, which empties into the Mississippi River at Grafton, about thirty miles above St. Louis, does not affect the purity of the water at the chain of rocks, a point a short distance above the city of St. Louis and from which its water supply is drawn. Examinations of the water from various points along the Mississippi River were made, beginning at a point about five miles above Grafton. These examinations showed that substances supposed to contaminate drinking water existed in dangerous quantities in the Illinois River, and also in spots in the Mississippi River between the mouth of the Illinois River and the chain of rocks, and also in the mouth of the Missouri River. At Grafton, however, about 1½ miles below the mouth of the Illinois River, the water is purer than at any other point in the river between Grafton and the chain of rocks. Below that point the pollution increases and diminishes at irregular intervals. All this is held to disprove the theory that any contamination at the chain of rocks exists from the Illinois River, and goes to show that offensive substances found in spots along the river between the mouth of the Illinois and the chain of rocks are due to local causes. Charts accompanying the report of the city chemist show the conditions existing at the mouth of the Missouri River, and suggest them as a much more probable source of pollution than the Illinois River. It is probable that no further investigations will be made by the city of St. Louis unless it is thought desirable to appoint a commission of experts, backed by sufficient money to enable them to make an exhaustive final report. The report of the city chemist will, however, do much to allay the fears of the residents of St. Louis at least.

Eastbound freight rates are now understood to be steady and remunerative. The regular tariff on everything except butter, eggs and poultry was restored on Jan. 1, according to agreement, and the stories of cutting which the Chicago reporters have been able to scare up since then do not concern traffic of much importance. They said last week that rates on flour by one of the lines running across the lake from Milwaukee were down to 15 cents, this being on account of the low rate in force from Minneapolis by the Soo Line, but the next day the Soo rate was restored. The Committees of the Trunk Line and Central Traffic roads last week agreed upon a report to the general managers, recommending an equitable distribution of all freight, including dressed beef and livestock, from Chicago, from points on the Elgin, Joliet & Eastern and from the Indiana, Illinois & Iowa road, going to or beyond Buffalo, Salamanca, Pittsburgh, etc. The distribution is to be by arbitrators to be appointed, wherever the roads do not agree among themselves. It was proposed that awards of percentages, being made on the basis of the proportions that had been carried by the different roads, should be revised only once a year, but the agreement when adopted will probably specify no fixed period, but leave arbitrators to use their own judgment. A clause in the agreement requires the president of each road to pledge his personal responsibility for carrying it out, and another states that it is the intent of the parties to consolidate agencies at competitive points as fast as they can. This agreement ought to be a considerable aid to stability of rates as between the Trunk Lines themselves (that is, the Grand Trunk, the Baltimore & Ohio and all between them, Chicago to New York), and if closely adhered to in this territory, ought to strengthen the power of members to resist the temptation to meet cuts made by lines from St. Louis, by the Chesapeake & Ohio, and other outsiders. As long as general business is dull the liability of secret reductions by these lines, all hungry for traffic, will be the chief danger besetting a trunk line agreement, but at present the disposition of the trunk line presidents to adhere to tariffs seems to be encouraging. There has been some newspaper talk of a pool, and there was, indeed, a proposition to equalize differences by the payment of money balances, but there is no likelihood that the presidents will agree to any such arrangement.

#### Uniform Classification.

It will be remembered that the Interstate Commerce Commission, in its annual report recently issued, recommends the passage by Congress of a law compelling all the railroads to agree, within a specified time, upon a uniform classification of freight, to be used with all interstate tariffs. This is the third time such a recommendation has been made, and the subject has been discussed in nearly every one of the annual reports of the Commission. The fact that such a desirable reform has been allowed to lag for seven

years, and that, nevertheless, there is no great public demand for it, nor any concerted move in its favor among even a small number of railroad officers; no allegation that the lack of uniformity in this matter has contributed to any of the transportation ills which are now so generally complained of, nor any definite statement of important benefits that the public would derive from a change, might reasonably be taken as good ground for letting the matter rest where it is; but the troubles due to diverse classification, such as there are, are real ones, and it may be worth while to discuss the matter briefly.

The obstacles to carrying out the change are, we believe, practically as great now as they were in 1887; but the Commissioners evidently do not think so; while they do think, apparently, that the reluctance of the railroads to take decisive action is due to their natural desire to have their own way, each for itself, regardless of other roads and the lawmakers. But it seems to us that the most public-spirited railroad officer imaginable, or a hundred of them, would find it impossible to effect this change, and that if it could be made the results would do as much harm as good.

There are three reasons for desiring a uniform classification. First, some few shippers want to be able to calculate rates for themselves instead of being obliged to go to the railroad agents continually. In the beginning of the agitation a shipper in New York made a loud complaint because he could not readily compute the freight charge on a barrel of sugar to Denver. But we cannot learn that this demand on the part of the public—certainly a legitimate one—affects more than an infinitesimal part of the freight which a classification covers. It is like the demand that all tariffs be open for public inspection at freight offices. This demand was complied with by the passage of a law, but the public tariffs, now hanging in thousands of stations all over the country, simply afford roosting places for flies, and people get their rates, as before, from the clerk in the office. The complaints under this head coming to the Commission are, we believe, almost wholly from occasional shippers who never send much freight under the tariffs complained of. Not for a moment should these people's rights be disregarded, but their wrongs should not be righted by a remedy which injuriously disturbs the rates of others doing a thousand times more business.

In the second place, uniformity of classification would prevent unconscious violation of the long and short-haul law. With one classification for local stations and another for points on connecting roads, a traffic manager might make inconsistent rates without knowing it. In the first year of the law this problem came up, and numerous managers, in their efforts to conform to the law, consolidated classifications, making many reductions in rates. But this demand, like the other, is, we believe, based on wrongs which are so small that there is no warrant for trying to cure them in this way as long as the cure is sure to produce more and larger wrongs.

The third reason for desiring a uniform classification is to make the work of the contracting agents easier. Clerks in New York or Pittsburgh, Cleveland or Cincinnati making rates to far Western or Southern points have to do a great deal of figuring and consulting, which could be avoided if one classification were in force throughout the whole route. But there need be no fear that the traffic managers will not make their clerks' work just as easy as they can in this respect. They will simplify the matter just as fast as they find that they can afford to.

There is a fourth reason why some people wish to consolidate classifications, which does not appear in the arguments put forth, but which is perhaps the most potent of all, and that is the likelihood that it will reduce more rates than it will raise. As the Interstate Commerce Commissioners, even including the conservative ex-Chairman, Judge Cooley, have generally held that their mission was to get justice for the public from the railroads, rather than to do justice to both parties alike, we do not know but this is the animus of the Commission in what it is doing now. To consolidate two or more classifications, some articles must be raised and others lowered. Where a price is reduced it stays reduced. Perhaps the railroads might get together and raise a rate sufficiently to offset the reduction effected by a change in classification if the increase did not affect a hundred other articles besides, but the fact remains that they do not do so. On the other hand, where a change in classification raises the price to any considerable number of shippers, they ask for a commodity rate—the restoration of the old rate—and they are pretty sure to get it, because the roads do not like the unpopularity incurred by raising a rate. The recent experiments in government regulation of rates in England are a



striking example of this difficulty. The efforts of the railroads to equalize earnings under the new law have raised a tremendous bullaballoo and have probably actually unsettled values of certain properties or products.

This universal lowering of rates by changing classification was a matter of common knowledge when the present "official" classification superseded a lot of others in trunk line and central traffic territory, and Auditor McCain, of the Interstate Commerce Commission, testifies to it in a recent published article on the Development of Freight Classifications.\* In fact, he enlarges upon this widespread reduction in rates as a great benefit to the shippers of the whole country. But we cannot think what railroad of any importance ought to reduce its rates at present, and we do not know of any important demand for lower rates except in commodities like grain and coal, fluctuations in which are already provided for in the classifications at present in use. Any reduction effected by unification of classifications is pretty sure to be one which is not specifically asked for, and it is therefore of no special value to the public except in a general way, as would be a general reduction in local passenger rates. Few, if any, railroads are now making such profits that they ought thus to reduce the cost to the public of its transportation, and even if there are such roads, and they could be singled out, the establishment of uniform freight classification would not affect them alone, for its very object is to produce effects alike on all roads, rich and poor.

The objection of railroads to reducing rates when their profits are already falling off is not their only reason for not agreeing upon a uniform classification. The committee that has been at work at the problem has honestly endeavored to overcome the obstacles in its way, but has found them really insurmountable. Merely making the current changes in the present Official Classification, as required by individual demands here and there, is such an elaborate process that the friction is almost enough to stop the wheels. No road or combination of roads can ask another to reduce a rate, impairing its revenue, or to make an advance, which is liable to drive away business, without first giving it an opportunity to present its objections; and it therefore comes about that the practical consent of a hundred traffic officers must be obtained before a change can be made. It can readily be imagined that under such conditions changes are not made except where there is a definite demand which justice to shippers or prospective increase of net earnings makes it important to grant. To consolidate the associations of two or more such large territories would not only increase the number of members proportionately, but would multiply the difficulties in a much larger degree—perhaps as the square of the increase in mere numbers or mileage. Moreover, representation on a national classification committee would be difficult to adjust. The voting should be somewhat in proportion to the magnitude of the traffic handled by the roads voting, but that would necessitate the use of cumbersome machinery to produce small results.

If the Interstate Commerce Commission were to prescribe a classification and have authority to enforce it throughout the country, as the advocates of uniformity desire in case the railroads do not voluntarily act, the difficulties arising from the organization of committees and the equitable adjustment of disputed questions would be out of the way. The necessary changes would be arbitrary at best, and it would make little difference whether they were based upon a true or a false estimate of how much one tariff ought to be raised or another reduced in a given case. The railroads, not being responsible for the charges, could the more easily answer the complaints of dissatisfied shippers. But no one proposes to forbid the use of commodity rates, and the result would probably be the same as if the change were made by the railroads; rates reduced would stay reduced, and the increases would be nullified by each road making commodity rates wherever the traffic was heavy in the particular article that was raised. The change would thus be a benefit to the small scattered shippers, and have no effect on the large ones. But reductions in classification would help large and small shippers alike. If sugar, for instance, were raised from third class to second, in a given territory, every large shipper of sugar would have to be given the old rate in order not to chill his trade; if, on the contrary, sugar were to be lowered one class, the large shipper would be suited, but the road, in order to avoid loss on sugar in other parts of its territory, would be obliged to raise the class rate (giving the large shipper a commodity rate as before), which

would advance the prices on a hundred other commodities; and that would be out of the question. Theoretically this advance need not be large enough to trouble any one much, but practically it would not be feasible to make it without doing at least as much harm as good.

Uniform classification is desirable, but not on such important grounds as to warrant disturbance of railroad earnings or the stability of rates to large shippers. A thousand individual shippers want more convenient tariffs, but it would be better for the railroads to grant them 5,000 commodity rates than to disturb their relations with 100,000 other shippers, and all to no profit.

#### Eastbound Freight from Chicago in 1893.

During the year 1893 the total tons shipped east from Chicago by the 10 railroads which appear in the table below were, in round numbers, 3.3 million tons; in 1892 they were 3.7 millions, a decrease of 12.6 per cent. The distribution of this business among the roads appears in the table.

Road.	Tons.	P. c.
Michigan Central.....	422,289	12.9
Wabash.....	25,033	6.8
Lake Shore & Michigan Southern.....	590,020	18.0
Pittsburgh, Ft. Wayne & Chicago.....	425,861	13.0
Pittsburgh, Cincinnati, Chicago & St. Louis.....	373,179	11.4
Baltimore & Ohio.....	188,158	5.7
Chicago & Grand Trunk.....	288,558	8.8
New York, Chicago & St. Louis.....	278,317	8.5
Chicago & Erie.....	364,285	11.1
C., C., C. & St. Louis.....	125,577	3.8
	3,281,280	100.0

The week ending Dec. 30 more freight was carried east by the railroads than in any other week of the year—113.5 thousand tons. The week coming nearest to this was the first one of January, 1893, when 93,000 tons were carried and the next was the week ending March 25 with a record of 92,600. The fluctuations through the year may be shown by a

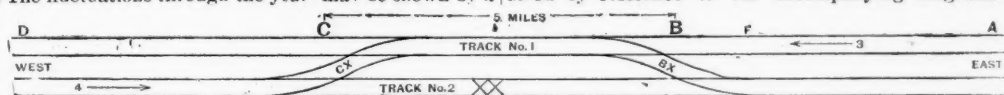


table giving the shipments for each four weeks. In this table they are given in thousands.

Week ending	1,000 tons.	Week ending	1,000 tons.
Jan. 28 1893.....	319.2	Aug. 12.....	199.4
Feb. 25.....	300.8	Sept. 9.....	191.4
March 25.....	347.0	Oct. 7.....	208.5
April 22.....	282.5	Nov. 4.....	248.4
May 20.....	223.4	Dec. 2.....	209.5
June 17.....	225.3	Dec. 30.....	319.6
July 15.....	198.9		

From April till about Dec. 1 the lake competition, of course, affects the rail shipments, but the serious decline through the summer months shows special influences, for we see the amounts still falling long after the full effect of the lake trade had been established and we see them beginning to rise long before the lakes closed. The extreme business depression of July, August and September must account for a good deal; but we suspect that a good deal of freight was lost to the trunk lines, because so much of their capacity and energy was absorbed in carrying World's Fair passengers at about cost. Gradually the figures will begin to emerge, and it will be possible to form a somewhat accurate opinion of the actual gain or loss of the railroads due to the World's Fair; but there are even now many facts that indicate that taken together they lost more than they made. The heavy movement of December reflects the cut in rates late in November and the agreement to restore them Jan. 1, as well as the complete closing of navigation.

As a slight contribution to the search for the guilty parties in the recent rate cuttings we give below a table of the eastbound shipments, in thousands of tons, of the various lines or groups of lines in the eight weeks ending with the dates which stand at the heads of the columns. If one will take the percentages of increase in the period ending Dec. 30, over that ending Nov. 4, he will see that some of the lines that have been most accused must have sold themselves very cheaply.

	Nov. 4.	Dec. 2.	Dec. 30.
Three Vanderbilt lines.....	101.2	89.2	132.6
Two Pennsylvania lines.....	60.0	60.4	94.8
Wabash.....	16.5	14.5	18.9
Balto. & Ohio.....	14.5	11.2	14.5
Chic. & Grand Trunk.....	11.5	15.0	30.8
Chic. & Erie.....	37.6	25.5	30.4
C., C., C. & St. Louis.....	14.1	7.8	10.7

#### Duplicate Train Orders on a Double Track Railroad.

The superintendent of an Eastern road asks what is the best form of telegraphic train order to use when one of the two tracks, on a double-track railroad, is temporarily used, for a short distance, for running trains in both directions. He means, of course, on such occasions as wrecks, blocking one track for a few hours or perhaps a day. If single-track conditions were to prevail for several days, a general order would be issued directing the use of the regular single-track rules.

At first sight this question might seem superfluous

It is only necessary to hold all trains in one direction, and give the necessary orders to the others; and this is so simple that any clear-headed station agent or conductor can do all that is necessary. When there is a competent person at one end of the obstructed section where he can give most of the orders without using the telegraph, this plan is often resorted to, and the chances of error are exceedingly small. But giving orders without the restrictions and safeguards imposed by the telegraph rules offers a temptation to relax the regulations, and it is sometimes better to give the orders from the dispatcher's office, even if that be a hundred miles away; and so it may be well to consider the matter for a moment. An emergency of the kind referred to seems to require the suspension of the duplicate-order principle, and the question is therefore of interest to every superintendent or dispatcher who desires to see that principle jealously guarded.

The conditions vary with the density of traffic, the length of track to be used single, the arrangement of cross-overs at the stations where the trains are to be run from one track to the other, and the convenience with which the dispatcher can issue orders, or the extent to which his regular duties hamper him in case of a special call for such extra work; and the mere prescription of a form does not answer all the legitimate questions of the problem implied by our correspondent's question; but so far as a form does go, the following very simple one is doubtless the best.

To Conductor and Engineer No.

10 at C:

Number four (4) will run from C to B on track number one (1) regardless of westbound trains.

JOHN DOE, Supt.

The names and numbers in this form will be understood by reference to the accompanying diagram.

Train No. 4 belongs on track No. 2, that track being obstructed at X. The last four words in the body of the order can just as well be omitted where the regulations and discipline are sufficiently strict, as the order, if valid, is certainly so without them, but we have included them so as to conform to custom. Custom still has a good deal of respect for tradition.

This form presupposes several things. The tracks must be numbered and the numbers clearly stated on the time-table, so as to be familiar. The standard code must be in use, so that this order when given to a westbound train will be understood and accepted as an order not to interfere with the passage of train 4 from C to B. A fixed train-order signal must be in use at both B and C, so that there shall be no doubt as to where the single-track right begins and ends. The train sheet, showing the passage of every train running between A and D, must be so kept that the person giving the order knows the position of all trains at the time he issues it. There must be established yard limits, so that all trains westbound, except first-class, will approach B under control, so as not to foul the crossover BX when it is in use. Still better, of course, to have distant signals at all stations, so that any train can be slackened at a proper distance by the station operator. Unless there is such a signal at C to stop eastbound trains before they reach track CX, the order ought to be sent to D. Every one knows, of course, how to get along without these favorable conditions, but what we are aiming at now is to issue a brief and simple order and feel perfectly safe in doing it. Brevity does harm instead of good if it causes the dispatcher anxiety or necessitates a lot of auxiliary orders or inquiries.

The main question, however, is that concerning what parties the order shall be delivered to. The conditions under form J in the Standard Code forbid the use of an order like this unless a copy of it is delivered to all westbound trains. This involves much unnecessary telegraphing, and if the person giving the orders is stationed at C, where he can give orders to eastbound trains without telegraphing at all, it may waste considerable time. We think that the suspension of the duplicate principle is clearly justifiable. In beginning to use such a piece of single track, the dispatcher or other person in charge has first to clear it of trains that ordinarily have the right to it, and in this he has no aid from the duplicate principle; safety depends upon his individual care in seeing that the train sheet shows every movement that affects the situation. He thus is put upon his guard at the outset. Trains of different classes generally have to be treated alike; that is, their right to be moved does not depend much upon their superiority over some other train, as ordinarily understood, and the dispatcher's work is thereby simplified. The chance to make a mistake in the name of a

\* This article is referred to in another column.



station is practically eliminated; and if form *J* is used to hold westbound trains, the order being annulled whenever necessary and a new one issued to protect the next eastbound train, the danger from mistakes in train numbers is equally small. If, therefore, the lessening of the number of telegraphic transmissions will help to avoid blockades, it should certainly be availed of, for such blockades might easily cause more complication, and even danger, than the added safety of the duplicate system would offset in a hundred years.

The considerations we have set forth apply under ordinary American conditions. If the station operators are educated to block trains a station apart, and to do it easily and without fuss—as it is done on the Baltimore & Ohio, for instance—the argument for extreme caution in maintaining the duplicate system is still further weakened. But to set operators to blocking trains, without any preliminary instruction and at a time when, by reason of a wreck or other unusual occurrence, they might be already overworked, would be an expedient to be adopted only with great caution. An emergency like that illustrated in our diagram generally demands, however, that trains follow one another as closely as possible, and absolute blocking against rear collisions would not be thought of, except perhaps for passenger trains.

The English custom of employing a pilot man, with a red flag tied around his arm, to conduct all engines over a piece of temporary single track, is the same, essentially, as the staff system; and that is a block system, as against butting collisions, though not as against rear. This method is all right, if the regulations providing for it are well understood, and if the pilot, or the man who gives him his instructions, can keep constantly posted as to what trains are likely next to demand the right of way to the single track. But in some cases the pilot is constantly finding himself at the wrong end of the line, and an engine has to be provided to take him to the other end. Under such circumstances, most managers would want to know why \$20 was spent for an engine where 20 cents' worth of electricity would answer. This matter of a pilot is somewhat aside from our subject, however, which has to do with the operation of a piece of single track by telegraph when other means are out of the question.

The discussion of a question like that before us brings out in a forcible manner the inconveniences that we put up with for lack of such a simple thing as a pair of distant signals at each station. Without these the single train order signal can protect a cross-over track only in one direction. To make sure that westbound trains will stop at *B* it is desirable, and by many deemed necessary, to place an order at *A*, directing all trains to stop at *B* for orders. If this is not done a flagman must be sent to *F*, and in the case of a train which does not respect yard limits at *B*, he must go farther back than *F*.

It should be borne in mind that the use of a regular form of order ought to be required, when the dispatching is done by an agent or conductor, the same as though it were done by the regular dispatcher. Much friction, if not risk, often results from the clumsy way in which orders are worded and issued by men who are a trifle "rusty" in their ideas touching the minute details of dispatching. As to whether such men should be entrusted with work of this kind we cannot formulate a rule because so much depends upon the individuality of the man and upon local circumstances. On one large road we find that a conductor or trainmaster is generally assigned to this emergency dispatching, being sent to the station nearest the wreck, the managers believing that the regular dispatchers have so much regular work that the additional labor would swamp them. On another large road the dispatchers issue all these orders, the idea being that they should be attended to by the man who is most proficient in that kind of work.

"The development of freight classifications" is the subject of an article in the December number of *The Station Agent*, by Auditor McCain of the Interstate Commerce Commission. Mr. McCain, after reviewing the consolidation of freight classifications that took place on the adoption of the Interstate Commerce Law, states that the last revision of the Official classification (No. 11, dated January, 1893) contains 5,634 descriptions, about double the number in the first Official classification, issued in 1887, and 5½ times as many as were in the westbound classification of 1886. This classification covers most of the traffic east of the Mississippi and north of the Ohio River. Of the 5,634 descriptions now embraced in the list, 38 per cent. have no car load rate, 55 per cent. have both C. L. and L. C. L., and 7 per cent. are exclusively for carloads. Fifty-three per cent. of the items are in the first three classes and 47 per cent. in the three lower classes. In

1886 only 15 per cent. of the articles described had car load rates. As the principal competitive rates between the Atlantic seaboard and Western points have remained about the same since 1886, the lowering of classification indicates a great lowering in prices. Besides the showing made by these percentages, there have been many changes from first class to second, from second to third, etc. The percentages are stated in tabular form as follows:

	1886.	1893.
Total number of descriptions.....	1,000	5,634
Proportion at 1st class 75c.	32%	25%
" " 2d " 65c.	24%	19%
" " 3d " 50c.	11%	19%
" " 4th " 35c.	31%	23%
" " 5th " 20c.	2%	4%
" " 6th " 25c.	0	5

In 1886 the number of articles charged 35 cents per 100 lbs. and lower was 33 per cent; in 1893 it was 47 per cent. In 1886 the average rate on all descriptions was 63 cents; in 1893 it was 48 cents. It does not appear whether Mr. McCain has included cross-references (duplications) in making his computations. These, together with the very elaborate subdivisions in the descriptions of some commodities, make the whole comparison somewhat arbitrary, though of course the general tendency of the changes that have been made is correctly shown. Neither is it possible, from the study here made, to arrive at any estimate of the amount of traffic carried at the different rates, though the author states that the tonnage going west at fourth class has greatly fallen off since 1887, while that in the sixth class has greatly increased. Of the tonnage from New York, westbound, 60 per cent. is in the fourth, fifth and sixth classes. The present Western classification, which includes most of the business west of the Mississippi River, except that going to the Pacific Coast, now contains 3,658 descriptions, an increase of over 2,000 since 1886. The same tendency to place things in lower classes is observed here as in the East. The Southern classification now contains 1,752 descriptions, of which 18 per cent. have carload rates. Mr. McCain concludes that

"The freight traffic of the entire country will doubtless in the near future be conducted under one or a uniform classification. Pending the adoption of such a classification further progress in the line here indicated may be expected in each of the principal classifications now in use. It may also be reasonably expected that the charges for railway transportation will keep pace with the constant tendency to lower values and prices observed for the great majority of articles of commerce, and freight classifications will be largely the medium through which such results will be accomplished."

The answer made by Receiver Callaway, of the Toledo, St. Louis & Kansas City, to the petition presented by the trainmen of that road to the United States court in the matter of wages, is printed in the *Toledo Blade*, and it ought to be carefully read by editors, ministers and all "friends of man." It will be remembered that the trainmen on this road complained because the Receiver reduced their wages, and they asked Judge Ricks to order the old rates of pay restored. The first claim of the men was that a certain agreement of last June was violated. The answer states that this agreement was terminable on 30 days' notice; that such notice was given, and that extended conferences were held between the officers of the road and the representatives of the men. The great falling off in earnings is set forth, showing justification for rigid restriction in expenses. The number of employees affected by the reduction in wages was 1,300. The committee making complaint claimed to represent 400; the other 900 accepted the reduction without complaint. The Receiver says that other roads in the neighborhood having greater earnings per mile have made larger reductions in pay. The committee declining to accept the rates offered failed to submit any reduction which would be acceptable, though they inquired if a percentage reduction might not be made in the wages of all employees. This was refused because it would bear too heavily on men receiving very low wages. The Receiver then proceeds to criticize the statement made by the men to the court. They name a certain small sum as the average monthly wages received by engineers and trainmen, but this is arrived at by including every man who worked during the month, including some who worked only a part of the time. Business was very dull during the month complained of and some men were also absent voluntarily. The men say that the rates compelled the men either to quit work or accept a condition of pauperism, but the Receiver states that 26 engineers drew from \$100 to \$160; 17 conductors drew from \$100 to \$115; 43 firemen from \$50 to \$90, and 73 brakemen from \$50 to \$80. In view of the general business depression the Receiver doubts the propriety of calling this pauperism. The average monthly pay is also considerably reduced by the fact that a committee of 13 remained in practical idleness for more than two months, "pretending to be engaged in the business of regulating the wages of their fellow employees," but it is asserted that this business might have been finished up in a few days. These committeemen are understood to have been sustained by the contributions of their fellow employees, and the waste of \$4,000 in this way is pointed out. One of the arguments of the men was that some employees had better be discharged in order to give more abundant work to those retained, but, says the Receiver, it is at the same time claimed that these men whose discharge is asked for are among the constituents of the committeemen, and he believes

that they never authorized the committee to get their heads cut off. The published statement omits many facts bearing on the question, of course, and we do not pretend to pass upon the reasonableness of all of the Receiver's arguments; but certain minor points here shown are characteristic of nearly every controversy of this kind, and it is well that they have been made a matter of record.

Italy has been carrying out a programme of railroad extension nearly ever since it was united in the present kingdom, in 1870. The progress would perhaps not be called remarkably great here, but it has been decidedly too fast for Italy. In 1860 it had but 1,035 miles of railroad, and in 1870 3,747 miles. Since then the mileage has been:

Years.....	1875.	1880.	1885.	1890.	1892.
Miles.....	4,600	5,289	6,392	8,157	8,306

The earnings per mile increased until 1880, but they have fallen since, and the net earnings have fallen continually, and in 1892 were \$1,074 per mile, which is not half what they were in 1860, and 23 per cent. less than in 1870. And the railroads are not cheap; their average cost in 1892 was \$103,850 per mile. The result is that the profits of the roads do not nearly cover the interest on the capital invested, and the deficit grows from year to year. In 1892 the interest charges were \$53,000,000, and the income from the railroads available to meet it was only \$15,000,000, leaving the other \$38,000,000 to be provided by the taxation of a very poor population. The percentage of interest actually earned on the cost of the railroad system has been:

1870.	1875.	1880.	1885.	1890.	1892.
2.46	2.24	2.55	1.89	1.69	1.63

The railroad extensions have not been planned solely with a view to their economic effect, it is true. Italy is a recent combination of many different and often discordant small states; and the statesmen of the new kingdom considered it of the first importance to create a feeling of union among the several parts, for which intercommunication serves better perhaps than anything else. But there is a limit to the improvements, however desirable, which any community can provide itself with, and that limit is soon reached with a country like Italy, which is economically in many respects far behind the age and in some respects almost medieval; next to its army and navy, the over-rapid extension of its railroad system has probably most to do with the present financial troubles of Italy.

A recent decision in Pennsylvania is interesting on the question of boycott. In 1891 there was a memorable strike of the building trades of Pittsburgh over the question of nine hours' wages for eight hours' work, which brought building operations to a standstill for two months. The local dealers in building materials entered into agreement not to sell materials to contractors who gave employment to strikers. A contractor who was thus deprived of supplies brought suit to test the question whether such an agreement constituted an illegal boycott, and this suit has brought out an interesting state of affairs in Pennsylvania. The lower Courts gave a verdict of \$1,500 to the contractor and the Supreme Court now reverses this judgment. It seems that the legislature in 1869, '72, '76 and '91 gave employees the right to strike and to prevent others from working so long as no force was used. Previous to these acts such strikes and intimidations would have been an indictable offense under the common law. The Court in its opinion declares that the moment the legislature relieved one class—namely, the laborers—from the common law prohibitions against combinations to raise the price of labor, down went the foundation on which common law conspiracy was based as to that particular subject. The deduction was therefore made that however unchanged may be the law as to combinations of employers to interfere with wages when such combination takes the initiative, they certainly do not depress a market when they combine to resist another combination to artificially advance prices. In other words, the Court holds that it is a poor rule that will not work both ways, and that when labor organizations have successfully appealed to the lawmakers for special legislation in their interests they cannot complain if the Courts extend the same protection to their employers.

The street railroads of Chicago have just given about \$2,600 to their employees as rewards for efficient services during the past year. The points considered and the prizes offered on the various lines differed considerably. The Chicago City Railway Company's prizes were offered for efficient train services during the World's Fair period, the awards to be announced and paid on Christmas day. The points considered covered pretty nearly everything that goes to make up the duties of the gripmen, conductors, motormen and drivers. The employees of the cable, electric and horse car lines were considered separately, and four prizes offered to the men in each branch of the service, the first being \$100, the second \$50, the third \$25, and the fourth prize \$10. The West Chicago Street Railway Company offered a reward of \$25 or a two-weeks furlough to trainmen for general appearance and neatness, and has made awards to 40 men. The North Chicago City Railway offered prizes a year ago of \$125, \$75 and \$50 to gripmen for the best records in avoiding accidents, delays, blockades, and in general good work in the



management of cars. The list of prizes was, however, enlarged upon examination of the records, as a number of the men appeared to be exactly equal.

The Cincinnati, New Orleans & Texas Pacific, as most of our readers know, has a good many sections of its single track main line protected by automatic electric signals, operated by track circuits. Signals are provided at both ends of these sections, each being placed on the right hand side for enginemen entering the section. In the case of three new sections recently put in use, the notice to trainmen specifies that the conductor of a train passing out of a section must observe the signal which admits to that section trains going in the opposite direction and see whether it changes from red to white; if it does not, he must report the fact to the Superintendent. When an engineman finds a signal against him or out of order he must not only stop before entering the section, but must give the whistle signal for the rear brakeman to go back and also send a flagman in advance; and he must not proceed until the latter has been gone five minutes. There is an exception to this rule to avoid delays where trains are approaching a meeting point which lies within a block section.

A large part of the public, and particularly officers of railroad companies, will be glad to learn that the expiration of the term of government protection of each patent will hereafter be published as each expires. The publication will be made in the *Patent Office Gazette* by an order issued by Secretary Smith on the 8th instant. This order is made, on the recommendation of Commissioner of Patents Mr. Seymour, in order that the public may receive due notice of the privilege of common use of patents. It will also be a boon to certain inventors who depend upon the use of another's patented invention to perfect or improve their own.

#### NEW PUBLICATIONS.

*British Railways: Their Passenger Services, Rolling Stock, Locomotives, Gradients and Express Speeds.* By J. Pearson Pattinson. Pages 252, illustrated. London: Cassell & Co., Limited. 1893. Price \$2.

In 1893 Mr. Pattinson wrote for the *Railroad Gazette* four articles on the passenger service of English railroads, with special reference to the speeds made with passenger trains, and to the express service, giving particulars of locomotives and of grades overcome. These were published in Aug. 12 of that year and in succeeding issues. On page 24 of the volume of 1893 appeared an article giving similar information, from notes of a trip through Belgium, Germany, Switzerland and northern Italy. Those articles will give the reader a fair notion of the principal part of the volume of which we write, but it treats of many matters of interest which were not touched there.

The introduction, 39 pages, treats generally of the subjects of speed and punctuality in England and on the Continent; of the passenger equipment and safety appliances; of locomotives, grades, loads and schedule times. The succeeding chapters deal with individual railroads, 14 different lines being considered.

In the introduction Mr. Pattinson discusses the well-known fact that speeds are much higher in England than on the continent, and that the express train-mileage run is very much greater. He takes Mr. Foxwell's figures to show that in 1884 there were in England and Scotland 672 trains, the schedule time of which exceeded 41 miles an hour, including stops, and which made a daily mileage of 62,900 miles. In 1883 there were but 409 such trains, and in 1871 there were only 57 which exceeded 39 miles an hour and only 225 which exceeded 36. In the matter of punctuality he is inclined to think that the railroads of continental Europe do better than those of Great Britain. But they should, as the schedule times are much slower and the lines much less crowded.

Of course it is known that in England and Scotland the great majority of travelers go third class, and, as a rule, the third-class equipment is very comfortable. On the lines south of the Thames, however, it is no so good. On the Continent, the third-class rolling stock Mr. Pattinson considers "miserable indeed." On those English lines which run second-class compartments there is but little difference between the second and third-class, as a rule; although south of the Thames the second-class vehicles are much superior. Generally speaking, the second-class compartment is only third class with a little extra upholstery and decoration. There are some English lines where the best third-class compartments are better than the second; of course the second class traveler has more room.

In the matter of heating, the English and Scotch railroads are behind those of the Continent. Local and suburban trains are often run without any provision for warming the carriages, and indeed there is seldom any other provision than the hot-water cases. The Caledonian, the Glasgow and the Southwestern have heated a few trains with steam, but the experiment has been only limited. The British railroads seem to be improving in lighting: gas is rapidly taking the place of oil for suburban traffic, but in many cases the pressure is low and the light unsatisfactory. On long-distance trains the lighting is not so good. The Northwestern trains are said to be well lighted; the Midland has fitted much of its stock for gas, and other companies are working in the same direction. On the Continent, he thinks the trains are even worse lighted than in England.

The chief value of the book is found in the particulars of the performance of individual railroads. Here we find tables of actual speeds of individual trains, as well as schedule speeds; tables giving the numbers of trains running at or above speeds of 35, 40 and 45 miles an hour; tables giving dimensions, weights and other particulars of locomotive equipment, and, what we have never seen brought together before, profiles showing the grades on selected portions of most of the lines treated of. These profiles are all drawn to the same scale, and although the scale is small the plates are clear, and the rate of grade is figured, so that one can get a very accurate notion of the work done. Other plates show in outline the standard engines used on many of the lines.

Mr. Pattinson does not write as a railroad man but as an amateur, and naturally he has fallen into a few errors in statement of fact, and perhaps some of his conclusions will not bear close analysis; but for its purposes the book is not only interesting but really valuable.

*The Science of Mechanics.* By Prof. Ernst Mach, University of Prague. A translation from the second German edition, by Thomas J. McCormack. Pages 538, 12mo., with 250 cuts, complete index and marginal headings. Chicago: The Open Court Publishing Co. 1893. Half morocco, gilt top. Price \$2.50.

This is a translation and emendation of the German edition which originally formed a volume of Brockhaus' "Internationale Wissenschaftliche Bibliothek." It is a critical and historical exposition of the principles underlying mechanics and is predominantly philosophical, the subject being presented not for technical discipline nor for the uses of engineering students, but as a history of the development of physical science as contained in the subject of mechanics. The work is comparatively elementary in its character, but presents a good deal of the history of physics and of the great men identified with physical phenomena. Much of it is given in the language and form in which the original investigators presented it, and in this respect the book is novel, and as interesting to advanced students of mechanics as to the beginner. The work will, no doubt, receive as great favor in this country as it has abroad, and the presentation of the subject as it occurred to the original discoverers will make it intensely interesting to young students. The book does not treat the subject as a branch of mathematics, but as one of physical sciences, though it has employed the formulae and precise terminology of mathematics. Another feature of the book is a chapter on the relation of other sciences to mechanics, omitted from modern textbooks on science, but it is presented here for the reason that religion and philosophy played an important part in the development of physics and is excusable on that ground, being a matter of history.

The book is admirably printed and bound and at first glance would be taken for an English edition. The presswork is unexcelled by any technical books that have come to our hands for some time and the engravings and figures are all clearly and well executed.

*Helical Gears; A Practical Treatise.* By a Foreman Pattern Maker. New York: Macmillan & Company, 1894. Pages 127, 12mo. Many illustrations and folding plates, and an index. Price \$2.

This book is one of that valuable series published by Macmillan & Company, in which volumes have appeared on Pattern Making, Practical Ironfounding, Metal Turning, the Principles of Fitting, Dictionary of Mechanical Terms, etc. The series also includes a publication on Toothed Gearing, which is a valuable companion to this work. The fact that perhaps one-half of so-called helical gears are made incorrectly, and are therefore much worse than common gears, is what occasioned the book.

Excepting so far as the fundamental relations of the helical gears to the true screw are concerned, the book is of a practical character and is adapted to the requirements of the drawing-room, pattern-shop and foundry. The subjects treated are the friction of ordinary gears, the relation of the helix to helical gears, the case of straight teeth set diagonally, marking out and making spur tooth-blocks, marking out and working bevel tooth-blocks, pattern gears, molding helical spurs and bevels by machine, splitting helical wheels, designing the forms of teeth, and a chapter on practical results.

*Uruguay.* Bulletin No. 61 of the Bureau of American Republics. Revised to Sept. 1, 1893. Pp. 347; illustrated, map, index.

Following the plan of the previous handbooks of the Latin-American republics this bulletin essays to give a brief account of the general characteristics of Uruguay, its resources, history, political organization, population, means of internal communication, finance, banking facilities, educational status, commerce and navigation, together with a commercial directory, and a schedule of import and export duties. While the statements and statistics are approximately accurate, and serve to give a fair impression of the actual condition of things in Uruguay, there are frequent evidences of careless editing, as for example the length of the Central Uruguay Railroad is set down at 575 kilometers (= 358.5 miles), whereas its actual length is 581 miles, including the eastern and northern extensions. Carelessness in editing and proofreading is again displayed, where it is even less excusable, in the table of comparisons of the metric and U. S. standards of

weights and measures. The map accompanying the bulletin is a particularly good one.

*Cassier's Magazine* for January is a special New Year's number, and is a remarkably handsome piece of work. It contains excellent portraits of the authors of the articles, besides two or three other portraits of interest. These portraits and the numerous illustrations are beautifully printed. The articles and their authors are: Underground Electric Wires, by D. C. Jackson; Two Great Railroad Exhibits at Chicago, by John C. Trautwine, Sr.; The Economic Element of Technical Education, by L. S. Randolph; Some Anomalies in Steam Engine Design, by E. D. Leavitt; The Lessons of the Columbian Year, by Charles E. Emery; The Development of Unused Water Powers, by Samuel Webber; A Relation of Engineering to Progress and Civilization, by F. R. Hutton; Four Distinguished Names, by William M. Henderson; Emery Wheels and Some of Their Uses, by J. Wendell Cole; Electricity in Mining, by F. O. Blackwell; The Society of Naval Architects and Marine Engineers, by William H. Wiley; Protection of Industrial Property, by Edward P. Thompson; Wasteful Use of Exhaust Steam, by Albert Spies; and Small Sizes of Anthracite Coal for Steam Raising, by Eckley B. Cox.

The *Engineering Magazine* for January, 1894, is a souvenir number of the World's Fair. The articles are: Its [the Fair's] Value to the American People, Andrew Carnegie; Effects of the Centennial Exhibition, Gen. Goshorn; The Architectural Event of Our Times, Henry Van Brunt; Electricity in 1876 and in 1893, Prof. Elihu Thomson; The World's Fair and the Railways, H. G. Prout; An Era of Mechanical Triumph, Prof. R. H. Thurston; The Mining Industry and the Fair, R. W. Raymond; International Effects of the Fair, Edmund Mitchell; Designers and Organizers of the Fair, E. C. Shankland, Chief Engineer; Cost and Income of the Great Fair, Anthony F. Seeberger, Treas. We notice that the magazine has added a new editorial department, namely, Civil Engineering, conducted by Mr. John C. Trautwine, Jr.

#### Railroad Matters in Chicago.

[Continued from page 25.]

ing Western roads during the year 1893 and for the three preceding years compare as follows:

	1893.	1892.	1891.	1890.
Cars.	Cars.	Cars.	Cars.	
A. T. & S. Fe.....	17,478	19,824	17,398	20,192
C. B. & Q.....	43,430	60,201	55,234	44,840
C. & N. W.....	27,365	32,015	35,745	36,778
C. & Alton.....	13,837	16,149	17,893	11,242
Ill. Cent.....	39,965	37,220	38,729	23,203
C. & N. W.....	16,687	12,297	10,422	33,163
C. M. & St. P.....	39,215	34,635	34,581	31,939
C. & Gt. W.....	10,503	14,899	10,703	14,292
C. & E. Ill.....	6,731	8,419	8,518	1,301
Wabash.....	11,208	11,113	14,512	7,725
Wis. Cent.....	221	2,6	468	556
Total cars.....	252,650	277,065	274,233	225,239

The livestock traffic the past week, although showing an improvement over the week immediately preceding, failed to increase over the first week in January last year, an excess in the receipts of 21,444 hogs and 23,000 sheep being offset by a decrease of 11,000 cattle. The aggregate at the four leading Western markets, Chicago, Omaha, Kansas City and St. Louis, also failed to show any gain over last year, the totals at the four points for the week and same time last year being as follows:

	1894.	1893.
Cattle.....	93,500	167,500
Hogs.....	264,000	251,000
Sheep.....	70,000	53,000

The receipts at the above mentioned points the past three years compare as follows:

	Cattle.	Hogs.	Sheep.
Chicago.....	3,133,403	6,057,278	3,031,174
St. Louis.....	1,756,483	777,433	350,161
Omaha.....	1,852,453	1,407,051	252,272
Kansas City.....	1,600,700	1,918,400	502,300
Total, 1893.....	6,403,047	10,190,162	4,202,787
" 1892.....	6,456,192	12,190,322	3,071,199
" 1891.....	5,714,576	13,508,264	2,050,709

The heaviest decrease last year from 1892 was at Chicago, where there was a shrinkage in receipts of 438,390 head of cattle, 1,657,151 hogs, but a gain of 1,017,095 sheep. The loss on freights from hogs and cattle was severely felt by the chief livestock railroads, and the officers attribute a material portion of the decrease in earnings last year to that cause. And although they anticipate an enlarged traffic from hogs the remainder of winter and early spring months, they look for a continual falling off in the movement of cattle, compared with the same time the two preceding years.

CHICAGO, Jan. 8, 1894.

#### Proposed Railroad Improvement in Philadelphia.

The Philadelphia City Government and the Receivers of the Philadelphia & Reading Railroad have agreed upon a plan for abolishing 17 grade crossings on the line of that road in Philadelphia, beginning at Fourteenth street and extending westward, each party to pay one-half the cost. The general plan is to depress the tracks, making a walled cut for a four-track line, and rebuilding the various side tracks connecting with factories along the road, so as to have them enter th



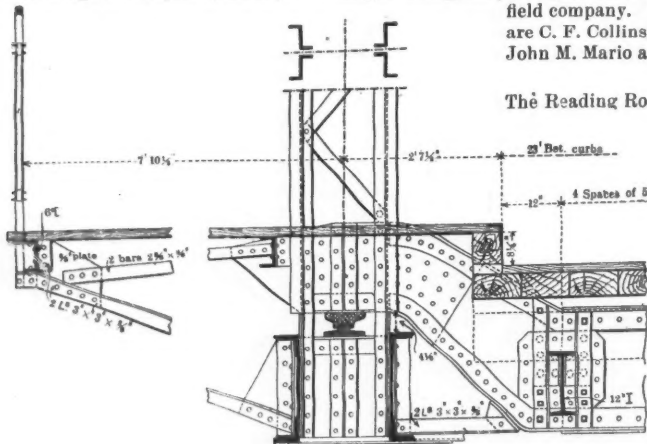
basements of the buildings with which they now connect on the surface. The estimated cost of the whole job is about \$6,000,000, and its execution depends upon the ability of the city to raise the necessary funds at a satisfactory rate of interest, and the approval by the court of the action that has been taken by the Receivers. The Philadelphia Times prints an ideal bird's-eye view showing the general appearance of a part of the proposed new road looking from Thirteenth street westward. It is proposed to depress Thirteenth street, and the next street (Broad) will have to be raised about 4 ft. Thence westward to Twenty-first street each transverse street will be carried across the railroad by a bridge. The railroad now lies in the middle of Pennsylvania avenue, there being wagon ways each side of the tracks. According to the plan it seems that these wagon ways will be abolished, the whole width being taken up by tracks. At Twenty-first street the line of the railroad turns to the right and runs northwesterly to and through Fairmount Park. This portion of the railroad, from the curve at Twenty-first street, will be covered with a masonry arch, forming a tunnel. The tunnel extends far enough to carry the tracks under the Green street entrance to the park. The receivers of the railroad promise, on approval by the court, to pay one-half the interest on the cost of the improvement and to contribute annually to a sinking fund which shall liquidate one-half the principal between 1904 and 1924. The Chairman of the Finance Committee of the City Government has introduced an ordinance authorizing commencement of the work. The location of this proposed improvement is shown in a railroad map of Philadelphia which was printed in the *Railroad Gazette* of Dec. 16, 1892. The eastern end of the depressed roadway will be near the Baldwin Locomotive Works.

Concerning this plan the Philadelphia Public Ledger says:

The cost of this magnificent improvement is estimated at from \$5,500,000 to \$6,000,000, and it is proposed that the entire cost shall, in the first instance, be assumed by the city, but that one-half of the amount expended shall be assumed and repaid by the railroad company, which is to advance one-half of the interest charge, together with an annual payment sufficient to retire one-half of the total cost within 30 years. Mayor Stuart, justly terms this offer on the part of the representatives of the railroad company a liberal one, but it is in our opinion wise and judicious. It is true that the railroad company occupies a position in which it might successfully obstruct this great improvement and maintain its tracks as they now are. The title derived from the Commonwealth of Pennsylvania, under the act of Assembly authorizing the sale of that part of the State Railroad from Belmont to Broad street, could not be impeached; and it must be conceded that those great industrial establishments which line Willow street and Pennsylvania avenue, and which are among the principal sources of the prosperity of the city, could only have been developed by the facilities which the railroad company has furnished. It may also be conceded that the railroad company could not be required to do more at Broad street than to carry out the plan agreed upon at the time of the enactment of the ordinance giving the consent of the city to the construction of the Reading Terminal, and that the expenditure for that purpose would not exceed one-half of the contribution which the company is now undertaking to make; but that plan was satisfactory to no one, and, if carried out, it would have fastened the tracks at their present grade beyond the possibility of change in the future. The perseverance of Mayor Stuart, which has finally resulted in securing the acquiescence of the receivers and managers of the road in his plan, entitles him to the heartfelt thanks of the people of Philadelphia. It will prove, we think, the greatest public improvement that has been accomplished since the acquisition of Fairmount Park. The expectation generally entertained by the property owners (most interested) that the enhancement in value will be sufficient to yield an increased return in the way of taxation in excess of the interest upon the proposed loan, is probably well founded, so that this most desirable improvement will probably pay for itself.

#### Floor System of a German Highway Bridge.

The illustration gives the floor system of a recently built highway bridge over the river Saar at Saarbrücken, which shows great care in the elaboration of its details. The bridge has a span of 203 ft., is of single triangular



Part Cross Section of Floor System, Saar River Bridge, Germany.

system, with a slightly curved top chord and inclined end posts. It has a roadway of 23 ft. and two overhanging sidewalks. The panels are subdivided by hangers, giving 16 panels of 12 ft. 8 in. each. The floorbeams rest on bearings over the center of the bottom chords and are independent of the posts. To the ends of the floorbeams are tied the overhangs, which push with their struts against the bottom chords. This thrust is transferred to the floorbeams by pairs of angles

connected by single bolts so as to admit of a free vertical motion of the floor system. The stringers rest with the edges of their end angles on the edges of plates which are riveted to the web-splice plates. The beams are secured in their positions by vertical angles bolted to the floorbeams, which reach over the end angles of the stringers. The stringer angles are slightly thinner than the plates on which they rest. In this manner are torsional strains due to the stringers avoided and the latter are supported closely to the floorbeams.

#### TECHNICAL.

##### Manufacturing and Business.

Operations were resumed at the Brooks Locomotive Works, Dunkirk, N. Y., on Jan. 2, after a protracted shut-down of four months.

The O'Dell Switch Manufacturing Company, recently organized, is reported to have decided to build shops at Elmira, N. Y.

The Consolidated Car Heating Company, of Albany, N. Y., has declared its regular semi-annual dividend of three per cent., payable Feb. 15.

The Youngtown Bridge Works resumed business Jan. 8. The company has secured a number of large contracts for bridges in different parts of the country.

The R. D. Wheaton Bridge Company has been chartered in Chicago, with a capital stock of \$50,000. The incorporators are R. D. Wheaton, G. F. Hoag and Charles H. Wheaton.

The Consolidated Car Heating Co., of Albany, has begun suit in the United States Circuit Court against the Chicago & West Michigan Railroad for infringement of the Sewall steam heating coupler patents.

The Consolidated Car Heating Co., of Albany, N. Y., has received a second order from England for direct steam storage heating equipments. These equipments are so arranged that the temperature in each compartment can be separately regulated.

The Pratt & Whitney Co., of Hartford, are now employing about 800 men and running their shops 40 hours a week, and they expect to increase both the number of men employed and the time very soon. They report a better inquiry, and believe the outlook is now quite promising.

The Litchfield Car & Machine Works last week filed for record a mortgage for \$180,000 in favor of preferred creditors on its works at Litchfield. Whether this action will have any effect on the proposed removal of the car shops to Memphis does not appear, but it means the abandonment of that plan.

Last fall the Buffalo Forge Co. equipped the general office building of the East Tennessee, Virginia & Georgia road at Knoxville with a fan capable of driving 12,000 cu. ft. of air a minute through the 1,800 ft. of heater pipe. Mr. Hudson, the General Manager, reported entirely satisfactory working of this plant and has contracted with the same company for a fan capable of delivering 82,000 cu. ft. a minute for heating and ventilating the great paint and wood-working shops. The dimensions of each of these buildings are 337 ft. x 90 ft. x 33 ft.

The Memphis Car & Foundry Company is the title of a company which has been organized to build new car shops at Memphis, Tenn., and its charter was filed in Illinois last week. Some months ago a bonus of \$200,000 was subscribed by Memphis citizens to secure the removal of the car plant of the Litchfield Car & Machine Works from Litchfield, Ill., to Memphis, and the present company has been organized to carry out the agreement then made by the directors of the Litchfield company. The incorporators of the new company are C. F. Collins, Henry H. Beach, John B. W. Amsden, John M. Mario and Louis C. Haynes.

#### Iron and Steel.

The Reading Rolling Mill resumed operations on Jan. 1 after an idleness of several weeks, giving employment to about 350 men.

#### New Stations and Shops.

The New York, New Haven & Hartford Railroad Company has opened a handsome office building, situated at the junction of Meadow and Water streets, New Haven, Conn. It cost about \$400,000.

The by law granting a bonus of \$100,000 to the Grand Trunk Company for the erection of car shops at London, Ont., was carried by a large majority at the recent election.

The Baltimore & Ohio, it is reported, has decided to go ahead with the erection of divisional machine shops at Benwood Junction, W. Va. A roundhouse was erected at this point last year, but the building of the shops was postponed.

The machine shops of Cox & Brothers & Co., of Drifton, Pa., are to be enlarged considerably, the new portion to be used for repair work on the equipment of the Delaware, Susquehanna & Schuylkill road.

The Wilkes Barre & Eastern is building an 18-stall roundhouse at Laffin, Pa., on the western end of its line near Wilkes Barre.

#### Steel or Malleable Drawbars.

A tabulated statement of the service record of 12 M. C. B. couplers (two all steel and 10 with malleable drawbars) is given below, taken from the St. Louis and East St. Louis Joint Car Inspector's reports for the months of September and October. It shows the number of M. C. B. couplers broken and number handled of the 12 couplers referred to during those months. We have this from the St. Louis Car Coupler Co.

Name of coupler.	Total couplers.	Percent- age broken.	Weight of drawbars. Lbs.	Material.
St. Louis.....	4,461	0.40	150	Steel
Chicago.....	2,680	0.45	165	"
Janney.....	26,317	0.40	178	Malleable
Gould.....	16,261	0.58	167	"
Buckeye.....	5,393	0.56	166	"
Hinson.....	3,381	0.62	164	"
Standard.....	2,501	0.79	155	"
Mather.....	570	0.70	181	"
Smilie.....	253	0.79	165	"
Trojan.....	532	0.91	164	"
Thurman.....	554	1.08	161	"
Van Dorston.....	183	1.61	170	"

In the above table, the weight of each make of drawbar is that given at the Watertown test, and the weights appearing in the above table are the averages.

#### Automatic Block Signals on the Reading.

The Philadelphia Record reports that the Philadelphia & Reading is to erect electro-pneumatic signals for a block system from Philadelphia to Norristown on the Norristown branch; to Germantown on the Chestnut Hill line and to Jenkintown on the New York Division. Two new power-houses will be erected. The aggregate length of line thus to be equipped is about 30 miles.

#### Westinghouse Machine Company.

Mr. George Westinghouse, Jr., has purchased the stock of Mr. Ralph Bagaley in the Westinghouse Machine Company. This gives to Mr. George Westinghouse and Mr. H. H. Westinghouse nine-tenths of the stock of the company.

#### Special Electric Reading Lamps.

The Metropolitan District (underground) Railway, of London, is about to introduce electric reading lamps so arranged that the passenger can, by putting a penny in a slot, get a direct and concentrated light on the page that he wishes to read. The lamp will be lighted for half an hour. Each carriage will have four of these lamps of 20 candle-power each. It is to be hoped that this experiment will be successful and that the idea will soon cross the channel. We need not say that it would be received with enthusiasm by Parisians, who would thus escape the weariness and inconvenience of the journeys through the interminable and incessant tunnels of the suburbs of Paris. Moreover, the ordinary lighting of the suburban cars of Paris is not so abundant but that a small addition would be received with joy, especially when it costs only two cents for half an hour. —*Journal des Transports.*

#### A Large Stack.

A large stack was recently completed for the Brooklyn City Railroad Company at its Kent Avenue power-house. It has, we believe, the largest cubic capacity of any chimney yet built, having 65,800 cu. ft. of air space. It is 293 ft. high, and the sides of the base measure 38 ft. 3 in. The chimney tapers for 85 ft. from the ground; then is of circular shape. The structure rests upon a foundation of 14 ft. of stone, 9 ft. of concrete and 1,200 piles. It contains over 2,000,000 brick, with a total weight of about 3,000 tons. The iron cap on the top weighs 5 tons, and is 27 ft. in diameter. A baffle plate is built on the inside to a height of 60 ft., which divides the chimney into two flues. The chimney is designed to carry away the smoke and gas from 36 500-H. P. boilers, using forced draft. Under the natural draft the stack should have been 70 ft. higher to accomplish the same results. The inner case of the chimney proper is entirely distinct from the outer wall and is 282 ft. high by 17 ft. in diameter, with walls 24 in. thick at the base and 8 in. at the top. This inner chimney is built to allow for the expansion due to the enormous volume of hot air carried off. The outer wall is built with 12 buttresses projecting inward and reaching to within 1/4 in. of the core, lateral expansion being thus provided for, which is estimated at 1/8 in. to the foot. Above the top of the core is an apron or toothing of brick, leaving an aperture 17 ft. in diameter, the diameter of the core. The new power-house was designed by F. S. Pierson, of Boston, and the construction of the chimney has been under the direct supervision of Mr. C. Harrison.

#### The Use of Compressed Air.

The present period of the world's history is often spoken of as the age of electricity, but this is not wholly warranted. It is no more an electrical era than it is a pneumatic, a hydraulic or steel era. It may well be characterized as an industrial era or as the age of engineering. To be convinced of this one has but to read the recent article by Mr. Whitfield Price Pressinger on the Widening Use of Compressed Air in the *Engineering Magazine*. Mr. Pressinger goes back 200 years to Peppin, the French engineer, and dwells to some extent upon various uses of compressed air. He does not take them in chronological order, but begins with the use of compressed air to transmit power long distance, and follows with mention of the use to sink bridge caissons, its use in mines at levels where steam would be impracticable, the pneumatic dynamite gun, pneumatic devices for block signaling, the raising of water from deep wells, the utilization of crude petroleum for fuel, the pumping of strong acids



and alkalies, the removing of rubber hose from the iron mandrils upon which it is cast, spraying of solutions on silk ribbons, pneumatic riveting machines, cranes and hoisting machinery, tubes for transmitting mail, refrigerating and ventilating and the propulsion of cars. He mentions the recent application of an old principle in the pneumatic culm and grain conveyers by which the culm and grain are conveyed or unloaded. He mentions a plant of this kind at Birmingham, having tubes of various dimensions which convey 25 to 60 tons per hour under 40 lbs. pressure to a height of 40 ft. The cost of unloading grain cargoes by this method is said to approximate 4 to 6 cents per ton. The author then mentions the disposal of sewage by air under pressure, the painting of the World's Fair buildings by spraying the paint through a hose or nozzle, the Australian sheep-shearing machine, the purification of water supply and the propulsion of vessels by imparting greater buoyancy. He mentions the placing of collapsible India-rubber bags in the holds of vessels, which are inflated and float sunken ships, the application of compressed air to the steering gear of ships, to supply divers in submarine operations, to mold patterns in foundries and numerous other uses, too numerous in fact to enumerate. He hopes for the time when compressed air will be transmitted throughout the city to operate elevators, pumps, printing-presses, lathe, lifts, sewing and washing machines and even clocks. The advantages of it are enumerated and compared with the disadvantages of steam, with its smoke, ashes, dirt, dust, odors, risks of explosion and expenses of cartage, mentioning also the increased rates of fire insurance and water tax; illustrating, as he suggests, the old maxim that, "importance oft attaches to trifles light as air."

#### Lights in Express Cars.

The Pintsch gas people are making a new departure in their system of train lighting. At the request of one of the prominent express companies they are arranging for the lighting of express cars with several lamps all operated from one controlling cock, so that in case of any disturbance from the outside, such as an attack upon the car, the lights can be instantly extinguished. This is an important modification which, as the express people remark, changes the target from the messengers to those who are attempting to rob the car.

#### Hennepin Canal.

The jury in the Hennepin Canal condemnation case, in the United States District Court at Chicago, brought in a verdict condemning a strip four miles long and 300 ft. wide, lying along Bureau Creek in Bureau County. The total amount of damages awarded was \$8,774. The Rock Island receives \$50 for a small piece. The average price fixed upon the land by the jury was about \$50 an acre, although in one case more was given as a consideration for consequential damages. Another suit is now on trial for a second four-mile section adjoining the one just passed upon.

#### The James Toleman.

The Westwood & Winby locomotive James Toleman, which, as mentioned in our last issue as in service on Chicago, Milwaukee & St. Paul, has been running in freight service during the past week somewhat irregularly owing to the difficulty of making and keeping up steam. The grates which were originally used in this engine were burned out and replaced by others supposed to be better adapted to the fuel used on that road. These changes have not, however, resulted in a satisfactory condition of affairs, and it is reported that those in charge have sent to England for a supply of coal.

#### Chicago Main Drainage.

The drainage canal contract and the machinery of the McCormack Construction Company were sold last week to the firm of Smith & Eastman for the sum of \$41,000. The sale was made in open court and the bid of the purchaser was \$33,000 for the contract and all of its reservations and privileges and \$8,000 for the dredging plant.

#### THE SCRAP HEAP.

##### Notes.

The Lake Shore road has restored the Erie and Buffalo accommodation and taken off the fast trains, Nos. 20 and 51, between Cleveland and Buffalo, which have connected with the Empire State express to and from New York.

The Columbus, Hocking Valley & Toledo has made a reduction of 10 per cent. in the wages of all employees receiving more than \$50 a month. The Pittsburgh, Shenango & Lake Erie has reduced all wages about 10 per cent.

The Chief Detective of the New York Central, in his annual report for 1893, gives the number of arrests made during the year as 183, and of convictions 123. Among the crimes specified are: Stoning trains, 3; car riding, 76; and tramps, 9.

The Atchison, Topeka & Santa Fe, whose tax assessments in the State of Kansas were largely increased in 1893, has sent lawyers to the several county seats in the state to endeavor to get the taxes reduced. It is reported that compromises have already been agreed upon in five counties.

Civil Engineer John D. Fouquet has made a report to the City Council of New Bedford, Mass., on the cost of

abolishing the grade crossings of streets with railroads in that city. Mr. Fouquet has investigated three different schemes and decides in favor of carrying the streets—nine of them—above the railroad tracks, and the cost of making the change by this plan will be something over \$600,000.

Governor Werts, of New Jersey, in his annual message to the Legislature, recommends that all grade crossings shall be abolished within the borders of the State. He recommends the passage of a law providing for their gradual elimination, the work to be completed within a specified number of years, the courts to select the crossings that must go first as well as to specify those that must be removed each year.

The fastest trip on record between New Orleans and Chicago was recently made over the Illinois Central by a special train (two cars) chartered by Mr. F. J. Dewes, of Chicago. The train left New Orleans at 12:20 a. m. Dec. 23, and arrived at Chicago the following day at 1:50 a. m., having made the run of 915 miles in 25½ hours, an average speed of 35.9 miles per hour. Engines and crews were changed eight times. This run beats the record between the two points by about four hours.

The New York State Board of Railroad Commissioners has reported on the accident on the Western New York & Pennsylvania near Dunkirk, Dec. 15, which caused the death of five and injury to the remaining eight persons on the train. The accident was caused by a trestle giving way under the train. It is recommended that structures of this nature and under similar conditions should be reconstructed, so as to give ample waterway, and that this particular trestle be filled and that an iron or steel girder bridge be erected upon stable masonry abutments.

The Chicago & Northern Pacific announces that it will fight any attempt to compel it to elevate its tracks within the limits of Chicago. The position taken by the road is that by the ordinance passed in 1872 the Chicago & Great Western, as the line was then known, was granted the right to enter the city at grade. In that ordinance and in a supplementary ordinance passed in 1885, the city gave this power on condition that the corporation build, at the direction of the city authorities, two viaducts (overhead bridges) each year. These ordinances being accepted by the road, it is claimed that they constitute a contract, and that neither party has the power to annul it; also, that as the viaducts have been built as directed the city cannot now demand that they be removed and the tracks elevated. As to the contention of the city authorities that the city cannot dispose of its power to protect the life and property of its citizens by granting such ordinances as would prevent its interference in their behalf, and that the city alone has the power to make and enforce police regulations, the road replies that the city has already expended its police power by compelling the railroad company to build viaducts for the protection of the lives of its citizens.

Representative Updegraff, of Iowa, has introduced in Congress a bill to amend the Interstate Commerce act by adding a provision that all express companies, associations, corporations, firms, persons and dispatch companies engaged in the transportation of property shall be deemed common carriers. These companies are to report to the Interstate Commerce Commission. In the Virginia Legislature a bill has been introduced regulating the liability of employers for injuries received by their employees by accident, negligence, or otherwise, while in the discharge of their duties. The bill prohibits the making of agreements whereby liability can be waived by employers or employees. A member of the Ohio Legislature has a bill to tax sleeping, dining, buffet, refrigerator and fast freight line cars. It is proposed to tax sleepers half a cent on each mile traveled. The auditing department of the roads will be required "to report by telegraph daily" to the State Railroad Commissioner the number of miles travelled by each car. A provision requires dining cars that run entirely within the state to pay \$40 a year for the privilege of selling liquor, and buffet cars that traverse the state on long runs will be taxed \$5 a year. Another bill introduced in the Ohio Legislature requires the granting of railroad telephone and telegraph rights of way in streets in a town or city to be let by competitive bidding, and sold to the highest bidder. Heretofore in Ohio rights of way in streets have been free to railroads, but if this bill becomes a law that will no longer be the case.

#### Duluth Traffic.

Coal shipments from docks at the head of Lake Superior have averaged 550 cars daily for four months, and there are now on dock 800,000 tons. Receipts by lake for 1893 were 2,000,000 tons.

#### Industrial Notes.

The last issue of *Bradstreet's* contains the usual summary of the industrial situation, in which we find that 46 factories and mills of various sorts have lately resumed work, as against 23 that have shut down. Included in the resumptions are the Brooks Locomotive Works, Dunkirk, N. Y.; Huntingdon, Pa., car works; Bellville, Ill., steel works; Reading, Pa., rolling mill; Martin's Ferry, O., iron and steel mills; Homestead, steel works; Berwick, Pa., car works; Duquesne, steel works and glass factory; Braddock, wire works; Pittsburgh, steel works; Scranton, iron and steel works; Camden, N. J., iron works; Bridgton, N. J., nail mills; Bethlehem, steel works; Braddock, Pa., steel works; Phillipsburgh, N. J., foundry; Pottsville, Pa., iron

mill. Among the closures are the Beaver Falls, Pa., steel mills; Wheeling, W. Va., iron works; Florence, N. J., pipe works; Providence, R. I., screw works; Coatesville, Pa., iron works; Huntingdon, Pa., pipe works; Norwood, Mass., railroad repair shops; Joliet, Ill., steel works, and Sparrow's Point, Md., steel works.

Another item in the situation with an important influence on the right side is the fact, which has lately become quite noticeable, that many firms which have been employing only sufficient men to keep their plants running are gradually increasing their forces to something like their usual complement in ordinary times. That is one of the hopeful signs, and it is one which cannot be indicated by figures.

#### South American Notes.

In response to a petition from the Midland, the Northwestern and the Northern railroad companies of Uruguay, the Uruguayan Minister of Finance has thrown open the port of Paysandu for goods in transit to and from the Brazilian State of Rio Grande do Sul via San Eugenio.

The Government of the province of Entre Rios, Argentine, has been authorized to invite tenders for the construction of a mole at Guayquichí. The Minister of Finance has placed at the disposal of the government of Entre Rios \$118,000 voted by Congress for this purpose.

The municipality of Santiago, Chili, has granted a concession to Señor S. Ossa for an electric railroad between that city and San Bernardo. The gas company of Valparaiso, Chili, also intends to put in an installation for lighting the streets of that port by electricity.

The freight rates determined upon by the Transandine Railway between Chili and Argentine are to be \$7.20 per ton for each section of the line, which, added to the rates on the Chilean state railroad to Valparaiso, will make \$16.80 per ton from that port to Mendoza, Argentine. The existing rate from Mendoza to Buenos Ayres is \$70.47 per ton, so that the cost of shipping a ton of freight from Buenos Ayres to Valparaiso will apparently be \$87.27. The distance from Valparaiso to Mendoza is 233 miles, and from Mendoza to Buenos Ayres 649 miles, a total of 882 miles. The rate would consequently be 9.89+ cents per ton per mile.

The concession granted to Charles E. Lister for the manufacture of iron and steel in Chili accords to the company which may operate under this concession all the scrap iron and steel belonging to the Republic, free of cost for three years. All pieces of rails not exceeding 2 ft. in length are also to be given free. At the conclusion of this period the company may obtain such scraps at 7s. 4d. per ton for 15 years. It may also import free of duty for 10 years sulphuric acid, hydrochloric acid, borax, sal ammoniac and metallic antimony up to a total value of \$15,000 per annum. It may also enjoy the free and exclusive use of 100 meters of sea frontage in the Bay of Talcahuano for 25 years. It is proposed to erect the works at Talcahuano, near the bay. The estimated production from the scrap iron and steel available in Chili is 10,000 tons a year.

#### Chicago Harbor.

Capt. W. I. Marshall, the engineer officer in charge of Chicago Harbor, draws a rather uncomplimentary picture of the Chicago River, which he says is the most important navigable stream of its length on the globe, leading in its arrivals and departures all the harbors of the United States, while in tonnage it is second only to New York. But the river, which has 16 ft. at its entrance, is obstructed by three tunnels with 16 to 18 ft. of water over their roofs, and has an average of four bridges to the mile. These bridges have abutments projecting into the river. Piles of rip-rap have been placed in the stream to protect insufficient bulkheads or docks. At numerous points the channel has been contracted, and bends in the river, now rigidly fixed by docks, are of too sharp curvature to permit the passage of the largest modern vessels. Add to these drawbacks the continued deposit of filth in the river, and it is not strange that differential mileage rates are charged against Chicago, and other towns are profiting at the expense of Chicago. It is recommended that the government continue its control so far as to preserve the navigation of the river from injury, but that before further appropriations the future use of the stream should be settled, "whether it shall continue to be as now, simply a long slip or succession of private slips, docks and wharves, utilized indeed for interstate and foreign commerce, but mainly for private and corporate gain, and for the main sewer of a great urban community, or whether it shall constitute a connecting link under federal control between the navigation of the Great Lakes and that of the Mississippi River and tributaries."

#### Length of Navigable Rivers and Canals.

The 1892-93 number of the *Jahrbuch der Naturwissenschaften* contains the following table which gives the lengths in miles of the navigable rivers and canals of the most important countries of the earth:

Country.	Rivers.	Canals.	Total.
United States of North America.....	15,502	3,064	18,566
Germany.....	14,490	1,214	15,713
France.....	4,963	2,898	7,866
Great Britain and Ireland.....	1,642	2,875	4,517
Russia.....	19,274	405	20,079
Austria-Hungary.....	7,691	382	8,073
Italy.....	1,732	294	2,046
Spain.....	750	248	998
Belgium.....	653	492	1,145
Portugal.....	422	.....	422
Sweden and Norway.....	423	92	515
The Netherlands.....	313	855	1,168
Canada.....	2,595	492	3,087
Brazil.....	20,433	.....	20,433
China.....	3,404	4,832	8,236
India.....	2,392	2,061	4,453

#### Turkish Railroads.

It is announced from Constantinople that the Turkish Government is entertaining the proposal to purchase all the railroads on its territory in Europe. The price would be paid in bonds, the interest of which would be defrayed out of the net receipts of the railroad. It is hoped at the same time that the receipts might be increased by having only a single administration, and by avoiding all superfluous competition of parallel lines.

#### The Nickel in the Slot Business.

The report for the financial year ended Sept. 30 states that the purchase of the Automatic Weighing Machine Company's business was only completed on the 15th inst., but it operates as from June 30 last, from which time down to Sept. 30 the profits of the Weighing Machine Company's business are brought into the accounts,



and, in respect of the same period, the 90,000 shares allotted as the consideration for the purchase, rank for dividend equally with the previously existing 91,130 shares. The net profits have, by the means above stated, increased from \$10,568 for the year ended Sept. 30, 1892, to \$15,691 for the year under review. The directors observe that, as the businesses of the Weighing Machine and Sweetmeat companies were worked separately during the three months in question, the savings which will be effected by the joint working have not yet begun to operate. Adding to the \$15,691, the profits of the past year, the \$2,052 brought forward, and deducting the sums paid by way of quarterly interim dividends, as regards the first, at the rate of 10 per cent., and as regards the other two, at the rate of 12½ per cent. per annum, a sum of \$10,086 is left available for distribution. The directors therefore recommend a final dividend for the last quarter—viz., that ended Sept. 30—at the rate of 17 per cent. per annum, making, as regards the original shareholders, the same dividend for the year as that paid the previous year—viz., 13 per cent., leaving \$2,398 to be carried forward.—*The Economist*.

#### Smoke Prevention.

Bearing upon the subject of smoke prevention, it is worth recalling that in 1890 the Society of German Engineers instituted a prize essay competition, offering two prizes, one for the best essay on steam boiler firing and the other for the best one on the household use of coal. It was intended that the essays should be critical reviews of what had been done in the past in the way of burning coal economically and with a minimum of smoke production, and should discuss the results obtained. The time limit for the essay on the first subject expired on Dec. 31, 1892, but none of the six essays which had been received were deemed worthy of the prize. Considering the importance of the subject, a new competition is to be instituted, and the money value of the prize to be offered is to be increased to 5,000 marks, or about \$1,250. An extra allowance of \$250 is to be made for expenses to be incurred in the preparation of drawings. Particulars of the competition can, no doubt, be obtained by addressing the Verein deutscher Ingenieure, Berlin.

#### General Electric Co.

The General Electric Co. has decided to consolidate its manufacturing interests at the factory at Schenectady, N. Y., while the Lynn plant will manufacture only small standard articles required in large numbers. The New York office and salesroom are to be removed, the company only retaining an executive office in New York, and Schenectady will be made the general headquarters. New buildings have recently been completed, and, as fast as required, the force will be increased and the works will be again run on full time. The lamp works will remain at Harrison, N. J.

#### The Boston & Maine Passenger Terminal at Boston.

The annual report of the Massachusetts Board of Harbor and Land Commissioners discusses the matter of the license granted to the Boston & Maine Railroad for widening the two bridges over the Charles River at Boston so as to cover the space between them with a pile structure and says: It was given upon the solemn declaration of the road, that it desired the license only for the purpose of erecting a temporary structure to provide for the immediate necessities of its passenger traffic until the problem of a union station and proper terminal facilities could be finally solved; and the board further says: "Instead of building a structure providing only for the temporary accommodation of its passenger business, the company, after making an agreement with the Fitchburg for a union station, proceeded to build the same at great expense and in a very substantial manner. This proceeding in no way discharges the corporation from its obligations to the Commonwealth under the contract contained in the license, although it may make the performance of that contract by the removal of the piles and the rebuilding of its bridges with stone piers more costly than it otherwise would have been. The fact that the corporation has chosen to make a large expenditure on a temporary structure should not at any future time be allowed to furnish it with an excuse for attempting to delay the performance of its contract with the Commonwealth."

The old Haymarket Square passenger station in Boston, which the trains of the Western Division have used for many years, was abandoned on Jan. 1, the business being transferred to the new station, which the Eastern and Lowell divisions had already occupied several months. The Fitchburg road's trains are expected to begin using the new station some time next summer. The abandonment of the Haymarket Square station does away with the very troublesome grade crossing at Causeway street.

#### Minnesota Land Decision.

Judge Williams, in the United States Circuit Court at Little Rock, recently disposed of the case of the St. Paul & Northern Pacific Railroad against the St. Paul, Minneapolis & Manitoba. The suit involved the title to a land grant of 118,000 acres situated north of the town of Watab, Minn., on the Mississippi River, its value being approximately \$1,000,000. The case was heard before Judge Williams, of St. Paul, last August and a decision was rendered in favor of the plaintiff. The matter came up on a petition of the defendant for a rehearing, and on motion of the plaintiff for a final decree. The motion to confirm the Master's report and to overrule the defendant's exceptions thereto was on all things granted, with the exception that \$30,000 was awarded the defendant for the labor expended in taking care of and disposing of the lands. The plaintiff is allowed interest only from the date of commencement of the action. The motion of defendant for a rehearing was also denied.

#### The Minnesota State Grain Elevator.

This somewhat celebrated case is at an end. The Supreme Court of that state last week handed down a decision which declares the business of owning and operating an elevator to be beyond the police power of the state. The act is declared to be a violation of the clause in the Constitution which provides that "the state shall never contract any debts for works of internal improvements, or be a party in carrying on such works."

This law was passed by the legislature last winter in response to a more or less popular demand made by the grain growers of the state. The sum of \$200,000 was appropriated for procuring the site, building the elevator, etc. The Board of Railroad and Warehouse Commissioners were directed, by the act, to purchase a site and to contract in the name of the state for the erection of an elevator provided with bins for the storage of each shipper's grain separately. Acting under the law the Commissioners purchased a site at Duluth and pro-

cured plans and specifications for the elevator. A large number of tenders were received from contractors and suit was begun in the District Court restraining the Commissioners from entering into a contract for the construction of the elevator and expending the state's money for that purpose. Judge Willis, of the District Court at St. Paul, held the act to be constitutional and one of great public beneficence. The complainant immediately appealed the case to the Supreme Court, with the result as above stated.

The Commissioners wisely held the matter of the execution of the contract in abeyance pending the decision of the higher court, and thereby doubtless saved the commonwealth a considerable sum of money. They have spent about \$16,000. Of this sum \$11,000 was for the site, which is worth all its cost, and the balance, \$5,000, covers the cost of the plans, advertising and incidental expenses.

Populists and calamity howlers generally will censure the court, although two of the members of the Supreme bench (there was no dissenting opinion) were elected by the votes of the Populists at the last general election. The Populist leaders assert that they will make it an issue at the next election.

#### LOCOMOTIVE BUILDING.

The Atlantic Coast Line is in the market for four passenger engines.

The Richmond & Danville is asking bids on from four to eight 10-wheel passenger engines for service on the new line to Florida.

The Lake Shore & Michigan Southern has ordered seven locomotives from the Brooks Locomotive Works. In addition to this contract the Brooks Works have orders for eight engines for the Buffalo, Rochester & Pittsburgh, and one for the Buffalo & Susquehanna.

#### CAR BUILDING.

The Fitchburg Railroad has this week given out an order for 600 cars.

The Cumberland Valley is constructing 40 box cars at the company's shops at Chambersburg, Pa.

The car shops of the Jackson & Woodin Mfg. Co., at Berwick, Pa., have resumed operations with nearly its usual force. The firm has a contract for 200 cars for the Buffalo, Rochester & Pittsburgh.

The Barney & Smith Car Company, of Dayton, O., has just built for the Cleveland, Cincinnati, Chicago & St. Louis a very handsome dining car. The car is 72 ft. long and the interior is finished in antique oak, hand carved.

Coxe Brothers & Co., of Drifton, Pa., and 143 Liberty street, New York City, are asking bids on 500 gondola coal cars for the Delaware, Susquehanna & Schuylkill road. The cars are to be built on Pennsylvania Railroad specifications.

The report printed last week that the Ensign Manufacturing Co. would resume operations at its car plant at Huntington, W. Va., was erroneous. The foundry, the only part of the Huntington plant now running, has been in operation most of the past year, and is likely to be kept at work, but the company has no present intention of starting up the carshops.

#### BRIDGE BUILDING.

Allentown, Pa.—The Grand Jury has recommended the erection of a new bridge over Coplay Creek in North Whitehall, and the widening of the bridge over the Monocacy Creek in West Bethlehem.

Bradford, Ont.—The bridge over the canal at the White bridge washed away by the recent flood will be rebuilt at once.

Louisville, Ky.—The Phoenix Bridge Company, of Phoenixville, is shipping material to Louisville to rebuild the fallen spans of the bridge across the Ohio River.

Ottawa, Ont.—R. Dale Harris, Chief Engineer of the Ottawa & Gatineau Valley and Pontiac & Pacific Junction roads, says that a surveying party to make a survey for the interprovincial bridge between Hull and Nepean Point will commence operations next week, and the work will be pushed with all vigor. This is the bridge toward the construction of which the city of Ottawa voted a bonus of \$150,000 on January 1.

Scranton, Pa.—A city election has been called for Feb. 20 to vote on the question of issuing \$250,000 of the city's bonds in order to build bridges over the Lackawanna River at Linden street and over Roaring Brook from Spruce street to Front street.

Plans for the construction of a \$35,000 viaduct over the Delaware, Lackawanna & Western tracks on West Lackawanna avenue have also been submitted. It is expected that the railroad company and the Scranton Traction Co. will each bear a third of the cost of this last-named structure.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

*Central of New Jersey*, quarterly, 1½ per cent., payable Feb. 1.

*Chicago, St. Paul, Minneapolis & Omaha*, semi-annual, 3½ per cent. on the preferred stock, payable Jan. 20.

*Huntingdon & Broad Top*, semi-annual, 3½ per cent. on the preferred stock, and 2½ per cent., payable Jan. 25.

*Northern Central*, semi-annual, 4 per cent., payable Jan. 15.

*Stewartstown*, semi-annual, 2½ per cent.

##### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Port Wayne & Jackson*, annual, Jackson, Mich., Jan. 25.

*Hamilton & Barton Incline*, annual, Hamilton, Ont., Jan. 16.

*Indiana, Illinois & Iowa*, annual, Kankakee, Ill., Jan. 17.

*Lehigh Valley*, annual, Philadelphia, Pa., Jan. 16.

*London & Port Stanley*, annual, London, Ont., Jan. 19.

*Monterey & Mexican Gulf*, special, New York City, Feb. 20.

*New York, Lake Erie & Western*, special, New York City, March 6.

*St. Catharines & Niagara Central*, annual, St. Catharines, Ont., Jan. 22.

*Worcester, Nashua & Rochester*, annual, Worcester, Mass., Jan. 18.

##### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

*The Central Railway Club* will meet at the Hotel Iroquois, Buffalo, N. Y., Jan. 24.

*The New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each alternate month, commencing January.

*The Western Railway Club* meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

*The New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

*The Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, except June, July and August, at 8 p. m.

*The American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

*The Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday.

*The Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

*The Tacoma Society of Civil Engineers and Architects* meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

*The Association of Engineers of Virginia* holds informal meetings the third Wednesday of each month, from September to May, inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

*The Boston Society of Civil Engineers* meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

*The Western Society of Engineers* meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

*The Engineers' Club of St. Louis* meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

*The Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

*The Engineers' Society of Western Pennsylvania* meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

*The Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

*The Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 8 p. m.

*The Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

*The Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

*The Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on second Tuesday only.

*The Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

*The Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

##### American Society of Mechanical Engineers.

A plan has been arranged by which monthly meetings of members of the Society of Mechanical Engineers will be held at the rooms, 12 West Thirty-first St., New York, for discussion of technical subjects. The second Wednesday of each month has been selected, and the first meeting was held last Wednesday evening. The subject discussed was the Development of Stationary Engines as illustrated by those as the World's Fair. Mr. Heminway, of the *American Machinist*, opened the discussion. Formal papers are not permitted, the talks are to be short, and, aside from the opening talk, the speakers are limited to five minutes and no one to speak more than twice unless all others who wish to do so have spoken. The purpose is to inject a little intellectuality into the local, informal gatherings of the society, which is rather prone to what some of its members call church sociables.

##### The Engineers' Club.

The annual meeting of the Engineers' Club (House at 10 West Twenty-ninth street, New York City) will be held Tuesday evening, Jan. 16, at eight o'clock, when five trustees will be elected to fill places made vacant by those whose terms expire at the end of 1893. The present membership of the club is 652, of whom 317 are non-residents. The net gain for the year was 50. The club is not only free from debt, but has a cash surplus of over \$11,000, the total assets, including accounts collectible, and furniture and the like at a low valuation, are over \$23,000. The cash on hand, Jan. 1, 1893, was \$6,800, and the total receipts for the year, including that cash, \$53,752. The disbursements were \$42,220.

##### Engineers' Club of St. Louis.

The meeting of the club on Dec. 20 was given up to hearing the reports of officers and committees and the election of officers. The Secretary reported the present membership as 180: resident members, 136, and non-resident members 43, and 1 honorary member. The result of the election of officers was announced as follows: *President*, B. L. Crosby; *Vice-President*, S. B. Russell; *Secretary*, Wm. H. Bryan; *Treasurer*, Charles W. Melcher; *Librarian*, T. L. Condon; *Directors*, Edward Flad and Robert Moore; *Members Board of Managers*, J. B. Johnson and S. B. Russell.

The Club has secured permanent quarters for its meetings in the building of the Massachusetts Historical Society, on Lucas place.

##### Western Society of Engineers.

Nearly 100 members attended the annual dinner of the Society in Chicago on Jan. 3. Capt. R. W. Hunt was Chairman, and delivered an address, speaking of the World's Fair and the connection of engineers with it, and referring also to important engineering works now being carried on in this country and in Europe. President-elect Herr also made an address, giving a history of the Society from its organization in



1890. The following is a list of the officers elected: President, Hiero B. Herr; Vice-Presidents, Daniel W. Mead and H. C. Draper; Secretary, Thomas Appleton; Treasurer, David L. Barnes; Trustee, Robert W. Hunt. Engineers' Club of Philadelphia.

At the regular meeting of the club held on Saturday, Jan. 6, 1894, a paper on "The Engineering Features of Irrigation," illustrated, by Maj. J. W. Powell, Director U. S. Geological Survey, was presented.

A business meeting was held on Dec. 16, 1893. President John Birkinbine in the chair. Thirty-three members and visitors were present. The following names were announced as those elected to membership: Active members, Messrs. James Madison Porter, John T. Rowland, Jr., Isaac Roberts Newkirk, J. Charles Ziegler and Herbert E. Havens; Associate members, Messrs. S. E. Moore, Charles M. Gwilliam and J. Lindsay Little.

Mr. A. Falkenau described some interesting features of the Department of Mechanical Engineering at the World's Fair. The disappointment expressed by many engineers regarding the Mechanic Arts Exhibit was probably due not so much to the lack of effort on the part of exhibitors as to the fact that the different fields for the application of power had been so thoroughly exploited that novel forms are few and advance is confined to minor details. In steam engineering the Fair only served to emphasize the fact that the stationary compound engine has come to stay. The De La Valle steam turbine had several new features. The main points to which attention was called were the methods of construction in the 40-in. Yerkes telescope and details regarding air compressors, exhibited by the Rand Drill Company.

The Yerkes telescope, the largest instrument of its kind in this country, has a tube 42 in. in diameter at the objective end, 32 in. at the center, and 38 in. at the eye-end. The sheet steel forming the tube varies from  $\frac{3}{8}$  in. in thickness at the center to  $\frac{1}{4}$  in. at the ends. The total weight of the tube is 6 tons. The declination axis carrying the tube is of forged steel 12 in. in diameter and 12 ft. long, its weight being 1  $\frac{1}{2}$  tons. This runs in segmental Babbitt bearings in the declination sleeve, which weighs 4 tons. The polar axis carrying the whole system is of hard forged steel, 15 in. in diameter at the upper bearing and 12 in. at the lower bearing, and weighs 3  $\frac{1}{2}$  tons. Just above its upper bearings it carries the main driving gear weighing 1 ton and having 360 teeth, by which the movement of the driving-clock is communicated to the polar axis.

The column supporting the instrument is 11 ft. by 5 ft. at the base, tapering to 10 ft. by 5 ft. at the top, and is cast in five sections, bolted together by internal flanges.

The special features of the Rand air compressor were its smooth running and lightness. These elements have been obtained principally from the system of compounding the air-cylinders, and to the use of a mechanical valve-gear. In the old single direct acting air compound, the energy applied to the steam piston being greater in the early and less in the latter part of the stroke, was distributed in a manner directly inverse to the work done by the air-piston, necessitating a heavy flywheel and heavy parts generally. The first step in improving this state of affairs was the construction of duplex air compressors with cranks at right angles. The tandem compound, or two-stage compression system, seeking economy in the work of compression incidentally causes a better distribution of the load, and cross compounding makes still another advance in this direction. For gas compressors, where very high pressures are required on account of economy and load distribution, the four-stage compression is used. By the reduction of a mechanical gear which relieves the spring pressure just before the valve opens, and applies it just before it closes, two large inlet valves are now sufficient, where six smaller ones were formerly used. Another interesting feature was an air and speed governor, so arranged that either could be used alone or both together, putting the machine entirely under the control of the engineer.

Among other interesting devices described were machines in the German exhibit for forming the thread of worms in the loam mold, a machine for jig-sawing steel or iron plates, and a connecting rod with a split bushing set up by applying pressure to a number of steel balls, filling a cavity behind the bushing, making the pressure almost as uniform as that of a fluid.

A fine suite of specimens alluded to in his discussion on "Riveting Pressures," at the last meeting, was exhibited by Mr. S. M. Vaulain. These had been planed through the bolts to show how they filled the holes, and then treated to an acid bath, which showed the direction in which the iron had flowed. They proved all that had been said at the last meeting with regard to the proper pressures for different diameters. Mr. Vaulain stated that, in his opinion, while cold riveting might do in other places, he did not believe hot riveting could be dispensed with for boiler work. Mr. E. K. Landis commented upon the strength of the acid bath, said that he considered that dilute acids used for a long time gave more valuable information, especially if accompanied by the use of a microscope, and thought that the results might be photographed for permanent record.

The President announced that the Publication Committee had now in course of preparation a complete index of the 10 volumes which comprise the entire set of the club's proceedings.

#### PERSONAL.

—Mr. Edward Richardson, Master Mechanic of the Pittsburgh, Shenango & Lake Erie Railroad, died at Greenville, Pa., on Jan. 3, of paralysis, aged 64 years.

—Mr. Robert H. Sayre, Second Vice-President of the Lehigh Valley, accompanied by his wife and daughter, sailed last week for Europe, expecting to remain abroad until April.

—M. Du Bousquet, Chief Engineer of Motive Power and Rolling Stock, Northern Railroad of France, was elected President of the Society of Civil Engineers (of France) at the meeting of Dec. 15.

—Mr. Reuben Stewart died in Concord, N. H., Jan. 1, aged 74 years. He was for many years General Manager of the Cheshire Railroad, but retired when the road went into the hands of the Fitchburg.

—The new Secretary of the New York State Railroad Commission is Mr. Charles R. DeFreest, of Troy, who has been for several years past Clerk of the House of Assembly of the New York Legislature.

—Mr. R. Forsyth, who has been Chief Engineer of the Illinois Steel Company, was recently elected Second Vice-President, succeeding Mr. H. S. Smith, who still remains a member of the Board of Directors.

—Mr. Howard Hancock, Secretary of Branch Roads of the Philadelphia & Reading, and Mr. John Welsh, Treasurer of the Branch Lines of the same company, have resigned, and the offices have been abolished.

—The report that Mr. A. N. Towne would resign the General Managership of the Southern Pacific obtained considerable circulation through the press dispatches this week, but the report was denied emphatically later in the week.

—Mr. William P. Henry is the name of the new General Manager of the Lehigh Valley Transportation Co., the Lake Steamer Line of the Lehigh Valley Railroad. The first announcement of this appointment gave the name incorrectly as James Henry.

—Mr. Henry Anthon, of New York City, who was elected a Director of the Louisville & Nashville Railroad at its last annual meeting, died in New York on Dec. 31. He had been the Stock Transfer Clerk of the railroad company for the past 20 years.

—Mr. C. M. Pratt, who recently resigned the General Passenger Agency of the Minneapolis & St. Louis to become Agent for the immigrant traffic at New York City for the Western Passenger Association, has recently had his title changed, and is now General Agent of the Association at New York City.

—Mr. R. G. Stone, Chief Clerk in the Passenger Department of the Georgia Southern & Florida road, has been promoted to be General Freight Agent, and Mr. G. A. McDonald, Clerk in the General Freight Department, has been made General Freight Agent, these changes being made on the resignation of Mr. A. C. Knapp as Traffic Manager.

—Mr. Robert H. Garratt, Division Passenger Agent of the Queen & Crescent at New Orleans, has been promoted to Assistant General Passenger Agent, with headquarters in the same city. Mr. Garratt has been in the employ of the lines forming the Queen & Crescent system for 30 years. He has been Division Passenger Agent at New Orleans for a number of years.

—Mr. H. L. Hollis and Mr. F. E. Emmerton have formed a partnership under the firm name of Hollis & Emmerton to continue the business of analytical chemists, metallurgical and mining engineers formerly carried on by H. L. Hollis & Company. Mr. Emmerton takes charge of the Cleveland office and laboratory, Perry-Payne Building, and Mr. Hollis remains at the office heretofore occupied by him in the Rookery Building, Chicago.

—Mr. Thomas L. Greene, the well-known writer on railroad topics, is now Assistant Secretary of the new Anthracite Coal Operators' Association. This association has lately been formed by about 60 of the principal independent operators. In other words it includes a large majority of all the producers of anthracite except the large companies controlled by the railroads. The President of the association is Mr. William Connell, and the Secretary and Treasurer Mr. C. D. Simpson. Mr. Greene has charge of the general office at New York City and is located in the Central Building, 143 Liberty Street.

—Mr. J. Van Smith, now Division Superintendent of the Philadelphia Division of the Baltimore & Ohio, is to become General Superintendent of the lines west of the Ohio River, with headquarters at Chicago. This is the position formerly held by Mr. Robert B. Campbell, who was recently promoted to be General Manager. Mr. Thomas Fitzgerald, who is now Superintendent of Transportation, will, it is stated, be made General Superintendent of the lines east of the Ohio River. This position was formerly held by Mr. Alfred Walter, who is now General Manager of the New York, Lake Erie & Western, and the office has not been filled since Mr. Walter severed his connection with the company.

—The resignation of Mr. T. H. Fennell as General Northern Superintendent of the Lehigh Valley has been followed by the appointment of three Division Superintendents for that part of the road. The appointment of Mr. C. A. Beach, formerly of the New York Central, as Superintendent of the Buffalo Division was noted last week. Mr. J. N. King has been appointed Superintendent of the Seneca Division, extending from Manchester to Coxtown, and Mr. O. O. Esser has been appointed Superintendent of the Auburn Division, extending to Sayre, Pa. Mr. Esser now holds the office of Superintendent of the Wyoming Division, and is on leave of absence and will assume his new duties when his leave expires. His successor as Superintendent of the Wyoming Division will be Mr. Alexander Mitchell, who formerly held that office but who has been Superintendent of Motive Power of the Lehigh Valley since 1892 when the road was leased to the Philadelphia & Reading.

—Mr. J. Van Smith, General Agent of the Baltimore & Ohio Railroad in Philadelphia, and Superintendent of the Philadelphia Division, will, it is reported, shortly be made General Superintendent of the company's lines west of the Ohio River, with headquarters in Chicago. Mr. Van Smith has had charge of the Philadelphia division of the Baltimore & Ohio in Philadelphia for six years. He was first Division Superintendent, and after C. K. Lord, Third Vice-President, moved his headquarters from Philadelphia back to Baltimore. Mr. Van Smith was made General Agent of the company at Philadelphia. Mr. Van Smith will occupy the position formerly occupied by General Manager Robert Campbell, and it is reported that Mr. Thomas Fitzgerald, now General Superintendent of Transportation, will be made Superintendent of the lines east of the Ohio River. This position has been vacant since the resignation of Mr. Alfred Walter, to become General Manager of the Erie road.

#### ELECTIONS AND APPOINTMENTS.

**Augusta & Savannah.**—The annual meeting was held in Savannah, Ga., Jan. 1 and the following board of directors elected: A. R. Lawton, G. S. Owens, Joseph D. Weed, Frank H. Miller, W. W. Thomas, H. H. Hull and F. S. Latrop. Mr. Latrop is the only new director, being elected to fill the vacancy caused by the death of W. S. Lawton. The following officers were elected: A. R. Lawton, President; Joseph D. Weed, Vice-President, and H. H. Hull, Secretary, Savannah, Ga.

**Baltimore & Ohio Southwestern.**—J. A. Conant, chief clerk to General Superintendent Hawn, has been appointed Superintendent of Car Service, and will assume the duties heretofore performed by the Car Accountant, which office is abolished. Mr. Conant will retain his position as chief clerk.

**Brooklyn Elevated.**—At the recent annual meeting of the road, the following new directors were elected.

Henry Sidenbergh, A. A. Drake and Austin Corbin, who succeed William Strauss, A. J. Hardenbergh and E. J. Richards.

**Central of Georgia.**—The annual meeting was held in Savannah, Ga., Jan. 1, and the following directors elected: H. M. Comer, Joseph Hull, H. R. Jackson, S. R. Jaques, U. B. Harrold, J. B. Holst, Abraham Vettesburg, G. J. Mills, C. H. Phinizy, E. P. Howell, James Swann, W. S. Tyson and L. T. Turner. H. M. Comer was re-elected President. The majority stock, held by the Richmond Terminal Co., was not voted at the meeting.

**Chicago, Burlington & Quincy.**—M. P. Benton, General Agent of the Great Northern at Tacoma, Wash., has been appointed Puget Sound Agent of this company with headquarters at Seattle, Wash.

**Cincinnati, New Orleans & Texas Pacific.**—George W. Cushing, recently appointed General Master Mechanic of this road, will have his headquarters at the general shops of the company at Ludlow, Ky., opposite Cincinnati, and not at Paducah, Ky., as stated a few weeks ago.

**Cleveland, Akron & Columbus.**—C. A. Chambers has been appointed General Agent (freight department) of this company at Cincinnati. O. C. J. McCaffrey, formerly traveling freight agent, has been appointed General Agent (freight department), with office at 26 North High street, Columbus, O. P. H. Rutledge has been appointed General Agent at Zanesville, O.

**Colorado Midland.**—R. C. Gowdich, Assistant Superintendent and Trainmaster of the Western Division, has resigned. The position formerly held by him has been abolished.

**Eureka & Palisade.**—D. J. Coiton, formerly Secretary, has been appointed Superintendent, with headquarters at Palisade, Nev., vice B. Gilman, resigned. J. L. East having resigned as General Freight, Passenger and Ticket Agent, the duties of that office will be assumed by the Superintendent.

**Great Northern.**—J. B. Kelly has been appointed General Roadmaster of the division between Minot, N. D., and Havre, Mont. The following changes in the traffic department are announced: Henry E. Danz, General Freight Agent, has resigned; W. J. Evans, formerly Freight Claim Agent, has been appointed Assistant General Freight Agent, with headquarters at St. Paul; James Young has been appointed General Agent at Milwaukee, vice S. L. Warren, deceased. F. E. Draper, Assistant Auditor of Freight Receipts, has been assigned the additional duties of Freight Claim Agent, vice W. J. Evans, transferred.

**Hot Springs.**—Frederick A. Bill has been appointed General Passenger and Freight Agent of this company with offices at Hot Springs, Ark.

**Lancaster & Reading Narrow Gage.**—These directors and officers were elected at Lancaster, Jan. 2: President, A. H. Peacock; Secretary and Treasurer, William Leaman. Directors, A. H. Peacock, John R. Bitner, John Keller, Geo. M. Franklin, B. F. Breneman, W. U. Hensel, William Leaman, G. J. P. Raub, Chas. H. Geiger, Robert Montgomery, Samuel Bair, Daniel Herr and S. M. Hess. This road was formerly operated as a branch of the Philadelphia & Reading, but the lease was surrendered some months ago and the trustees have since operated the line.

**Lehigh Valley.**—The following changes and appointments have been announced by General Manager Voorhees: Charles A. Beach appointed Superintendent of the Buffalo Division; J. N. King appointed Superintendent of the Seneca Division; Alexander Mitchell appointed Superintendent of the Wyoming Division, vice O. O. Esser, assigned to other duties. T. H. Fennell having resigned, the office of General Superintendent, Northern Division, will for the present remain vacant. The Superintendents of the Buffalo, Seneca and Auburn divisions will report direct to the General Manager.

The office of the Superintendent of Motive Power and Rolling Stock will be discontinued. The Master Mechanics at Easton and Hazleton and Superintendent Car Department at Packer on will report direct to the General Superintendent, Eastern Division. All other Master Mechanics will report direct to their respective Division Superintendents.

Charles B. Parker has been appointed Eastern Traveling Agent, with headquarters at 235 Broadway, New York City. E. H. Stokes has been appointed Traveling Passenger Agent, with headquarters at 204 South Clark street, Chicago.

**Mexican Central.**—M. H. King has been appointed Assistant General Freight and Passenger Agent, with office at No. 236 South Clark street, Chicago. He will have charge of all freight and passenger business in the United States. J. J. Allen is appointed General Eastern Agent, with office at No. 261 Broadway, New York City, vice H. B. Wilkins, resigned.

**Montana Central.**—The jurisdiction of F. J. Whitney, General Passenger Agent, and George O. Somers, Assistant General Freight Agent, of the Great Northern, has been extended to cover the lines of this company, vice B. H. Langley, resigned.

**Montreal & Occidental.**—At the annual meeting of the company held last week the following officers were elected: President, Hon. J. A. Chapleau, Vice President, D. Pollard; Managing Director, H. J. Beemer; Secretary, E. Redier.

**New York & Northern.**—At the adjourned annual meeting held at 32 Nassau street, New York City, Jan. 4, the following directors were elected: J. Pierpont Morgan, Jr., Frank R. Waller, Albert H. Gillard, William S. Townsend, G. W. Maslin, Charles H. King, Mortimer F. Smith, Henry G. Currier, John W. McCurdy, Walter B. Horn, C. F. Cox, Samuel Barton and W. H. Paulding.

**Northern Pacific.**—P. H. Noll has been appointed District Passenger Agent at St. Louis. J. F. Fitzgerald has been appointed Roadmaster, with headquarters at Jamestown, N. D., vice J. B. Kelly, resigned to accept service with another company.

**Oregon Pacific.**—Charles Clark has been appointed Receiver for the Oregon Pacific, vice E. W. Hadley, resigned. His headquarters will be at Corvallis, Ore.

**Pennsylvania.**—S. Pember on Hutchinson has been appointed Assistant Engineer of the Philadelphia Division, to fill the vacancy caused by the resignation of J. L. Cummings. J. H. Murphy, Assistant Engineer of the Schuylkill Division, has resigned, and the office is left vacant for the present.



**Philadelphia & Reading.**—At the annual election of the company at Philadelphia on Jan. 8 the total vote cast was 499,415 shares, of which 332,303 shares were voted for Joseph S. Harris. The following officers were elected for the railroad company: President, Joseph S. Harris; Managers, A. J. Antelo, James Boyd, Joseph F. Smitot, Thomas McKean, John Lowther Welsh, George F. Baer; Treasurer, William A. Church, and Secretary William R. Taylor. The only change from the previous board is the election of George F. Baer to succeed E. P. Wilbur.

**Philadelphia, Reading & New England.**—G. T. Royer has been appointed Assistant Superintendent, with headquarters at Poughkeepsie, N. Y. The position of Trainmaster has been abolished.

**Pittsburgh, Cleveland & Toledo.**—The annual meeting was held in Youngstown, O., Jan. 4, and the following directors elected: L. E. Cochran, Youngstown; W. J. McKinnie, Cleveland; J. H. Collins, Columbus; Orland Smith, Cincinnati; S. P. Peabody, Columbus; David Lee, Zanesville; R. T. Davies, Newark, O.; T. M. King, Philadelphia; E. T. Afeck, Columbus; J. V. Patton, C. S. Wight, J. R. McCreery, Pittsburgh.

**Queen & Crescent.**—R. H. Garratt, Division Passenger Agent at New Orleans, has been appointed Assistant General Passenger Agent at New Orleans, La. A. J. Knapp, who has been Chief Clerk in the general passenger department, has been appointed Assistant General Passenger Agent at Cincinnati.

**Rice Lake, Dallas & Menomonie.**—M. P. Barry, formerly of the Wisconsin Central, has been appointed Superintendent and Traffic Manager of this road, just completed for seven miles from Rice Lake, Wis.

**St. Paul & White Bear.**—At a meeting of the directors held in St. Paul, Jan. 2, H. M. Byllesby was elected President, and H. C. Lewis Vice-President.

**Terre Haute & Indianapolis.**—The new Board of Directors met Jan. 5 and re-elected W. R. McKeen, President, and John G. Williams, Vice-President and Manager. N. K. Elliott was elected Superintendent of the main line and Michigan Division and Benjamin McKeen, of the Peoria Division. Joseph Hill's title was changed from Assistant General Manager to General Superintendent. A. J. Gibbons was made Engineer of Maintenance of Way of the main line, and Victor Hendricks, Engineer of Maintenance of Way of the Michigan Division.

**Western New York & Pennsylvania.**—The annual meeting was held in Philadelphia on Jan. 8. The following Board of Directors was elected: Samuel G. De Courcy, Nicholas Thouron, George E. Bartol, Charles M. Lea, J. Rundle Smith, William C. Bullitt, John K. Barclay, E. W. Clark, Jr.; E. L. Owen, P. P. Pratt, Isaac N. Seligman, Rudolph Flinsch and Frank G. Rogers. The election of F. C. Rogers as a director in place of J. Roell, is the only change made. The road is now operated by S. G. De Courcy as Receiver.

Peter Fowler, General Foreman of the Lake Shore & Michigan Southern machine shops, at Buffalo, N. Y., has been appointed Master Mechanic of the Pittsburgh Division of this road, with headquarters in Oil City, Pa.

**West Shore.**—L. Merritt has been appointed Division Freight Agent, with office at 207 Kirk Block, Syracuse, N. Y., vice C. L. Van Woert, transferred. H. S. Burgess has been appointed Division Freight Agent, with office in the Board of Trade Building, Buffalo, vice L. Merritt, transferred.

**Williams Valley.**—At the annual meeting held at Tower City, Pa., Jan. 8, these officers were elected: President, Col. John Jameson, of Bloomsburg, Pa.; Vice-President, Carroll Williams, of Philadelphia; General Manager, A. F. Baker, of Norristown; General Passenger Agent, C. M. Kaufman, of Tower City.

**Wisconsin Central.**—H. J. Bergmann has been appointed District Passenger Agent, with headquarters at St. Paul.

#### RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

**Alpena & Northern.**—This road is now reported as practically completed from Alpena, Mich., northwest to Lake May, a small town in Alpena County. J. C. McCaul, of Detroit is Secretary of the new company.

**Baltimore & Cumberland.**—Mr. Chauncey Ives, Chief Engineer of this road, which is an extension of the West Virginia & Pittsburgh railroad to form a connection with the Cumberland Valley road, is quoted as saying that work on that line will begin at all points where it can advantageously be done, as soon as the weather opens in the spring. Some work was begun last fall, but it was discontinued temporarily on account of the stringency of the money market. All the preliminary work has now been done, and nearly the entire route have been decided upon. Negotiations for the right of way in West Virginia have been closed up and agents are at work in Maryland. The road starts from Cumberland and joins the Cumberland Valley line about two miles from Hagerstown, the distance being about 60 miles. Chief Engineer Ives made an examination last week of a new route into Hancock submitted by Murdoch's party of engineers. It shortens the line a mile besides doing away with two heavy cuts, one of which was estimated to contain 67,000 cubic yards, and the other 37,000 cubic yards. The line also gives a down grade of 30 miles to Hancock, and it is believed it will be adopted. Hon. H. G. Davis, Richard Kereus, of St. Louis; Col. P. E. Sexton, of Chicago; Samuel Rea, of the Pennsylvania Railroad, with Mr. Ives, and others interested, made a tour of inspection over the proposed lines from Hancock to Cumberland last week.

**Bangor & Aroostook.**—Regular trains have begun running from Bangor through to Houlton, Me., the present terminus of the line, which the tracklayers reached in the last days of December. This brings the mileage of the company now in operation on the main line up to 140 miles, north and northeast of Bangor, Me. The north division of the old Bangor & Piscataquis will be operated as a branch. For the present only mixed trains will be run on the new portion of the road beyond Brownville to Houlton, 95 miles. Passenger trains may be put on before February.

**Belva & Elk River.**—The incorporation of this company under the general railroad laws of West Virginia was noted last week. The road is not a new line, but has been operated as a private line since 1891. It is now completed for some 14 miles from Belva, and is narrow gauge, being used principally as a log and lumber line in connection with the Gauley Hardwood Lumber Co., and lately also for hauling coal from adjacent mines.

**Bentonville & Northwestern.**—Articles of incorporation were filed last week at Little Rock, Ark., by this company, with a capital stock of \$150,000. The incorporators are James Bohart, George Moore, W. Cloe, John D. James, Henry W. Schrader, of Bentonville, Ark. The road is to be built from Bentonville northwesterly to the Missouri line, about 12 miles.

**Buffalo & Susquehanna.**—The extension from the present terminus at Galeton east to Ansonia, Pa., has been fully decided upon by the officers of this company, and the contract for the work will very probably be let by the end of this month. The extension will be 18 miles long and will give the company a connection with the Fall Brook Railroad, securing it an outlet to Williamsport and the Philadelphia & Reading Railroad, as well as a new connection with the New York, Lake Erie & Western. The line has been located and will be built with maximum grade of 42 ft. to the mile and maximum curves of eight degrees. The bridgework will include two 100-ft. structures, two 60-ft. spans and two iron trusses of smaller dimensions. C. W. Goodyear, of Buffalo, is General Manager of the road.

**Carthage & Western.**—This road has been completed this year from Carthage southwest to Curriersville in Moore County, N. C., a distance of 11 miles. The line connects at Carthage with the Seaboard Air Line and will probably be operated as a branch of that road. The construction work has been carried on by an independent company, of which W. C. Petty, of Manly, N. C., has been General Manager.

**Chicago, Paducah & Memphis.**—This company has been recently incorporated in Illinois, as reported last week. It has been organized in the interest of the Paducah, Tennessee & Alabama; and probably the officers of that company will serve for the new company. The length of line will be about 150 miles, from Altamont, Ill., to the Ohio River opposite Paducah, Ky., through the towns of Altamont, Kinnurdy, Salem, Mt. Vernon, Benton, Marion, Vienna and Metropolis. The preliminary surveys have been completed. The contract for the work from Altamont to Marion, a distance of about 95 miles, will probably be let this month to Johnston Bros. & Fought, of St. Elmo, Ill.

**Cleveland, Wooster & Muskingum Valley.**—The track-laying has now begun on the extension of this branch road of the Baltimore & Ohio, south of Wooster, O. The extension will be about 20 miles long, and will reach Millersburg. Now that the rails are being laid the opening of the line is probably a matter of a short time as there is nothing to delay the track-laying. The grading was finished some time ago by McNair & Bracey, of Chicago.

**Coast Railway of Nova Scotia.**—The company heretofore referred to as the Nova Scotia Coast Railroad has been incorporated under the title of the Coast Railway Company of Nova Scotia, Limited. The road will extend from Yarmouth, where it will connect with the Yarmouth & Annapolis road and also the steamship line from Boston to Lockeport, a total length of 91 miles. The preliminary survey has been made over the entire line and the first 10 miles to Tusket has been located. The work will be light, and it is proposed to begin the construction in the spring. The gauge will be 2 ft. The freight to be carried will be mostly fresh fish, lumber and general merchandise, which is now carried by wagon or in small sailboats. The general contractor is A. H. Chadbourne, 29 Broadway, New York City.

**Elkton & Southern.**—The charter of this company has now been prepared by the local incorporators and the formal incorporation as proposed will probably be completed in a few days. The report of the preliminary survey made by the engineers in December has been received by the local committee, which will meet this week. The proposed line is about 25 miles long from Childs Station on the Baltimore & Ohio, south to the Baltimore & Delaware Bay road. Geo. Biddle and Dr. Howard Bratton, of Elkton, are the chief projectors.

**Florence & Cripple Creek.**—The above name is now the correct title of the company building into the Cripple Creek mines in Colorado from the south. The company was first chartered as the Florence, Cripple Creek & State Line, but the name was changed during the past year. The contractors, Orman & Crook, of Pueblo, have about 800 men at work. The line is 40 miles long from Florence to the mines, as already stated. The alignment of the road is an excellent one for a mountain road. It has been carefully located, and is now practically all cross-sectioned. The maximum grade is 3½ per cent., and the maximum curvature is 24 deg. Tracklaying will begin in February. The road is to be completed to Cripple Creek and ready for operation by May. Large reduction works will be built at Florence by the same interests engaged in building the railroad, to treat the low grade ores that do not pay the milling charges at the camp or the expense of transportation to the smelters at Pueblo or Denver.

The traffic which the road will carry will undoubtedly be very heavy from the opening of the line. The tonnage, of course, will include the ore out from Cripple Creek and the coal, merchandise, lumber and passenger business to the mines. David H. Moffat, President of the First National Bank of Denver and the largest mine operator in Colorado, is the financial head of the company. The president of the road is William E. Johnson; Vice-President, Eben Smith, and Chief Engineer, H. A. Sumner.

**Fort Bragg Lumber Co.**—This company will build a short railroad from Fort Bragg, on the Pacific Coast, to the coalfields near Round Valley, Mendocino County, Cal. Thomas L. Johnson, of Cleveland, O., and Gen. Russell Alger, of Detroit, are reported to be interested in the company.

**Fort Smith & Van Buren.**—This company has been incorporated in Arkansas to build a railroad from the northern limits of the city of Fort Smith northeasterly to the city limits of Van Buren, Ark., a distance of four miles. The incorporators are M. N. Beaty, Lima, O.; J. L. Rea, Van Buren, Ark.; George H. Walsh, Fort Smith, Ark.; R. S. Hynes, Van Buren, Ark., and W. C. Lement, Bucyrus, O.

**Jacksonville, St. Augustine & Indian River.**—Contractor John D. McEllan, who is building the Lake Worth extension of this road, has completed another section south of San Sebastian to Fort Pierce, Fla., about 28 miles, which was accepted by the railroad officers last week. This completes the line for a distance of 206 miles from St. Augustine, and 58 miles from the southern terminus at West Palm Beach, near Lake Worth. The road, however, has been built north from the southern terminus to Jupiter, a distance of 18 miles. At Jupiter a connection is made with steamboats which ply on Indian River, and this section on

the southern end of the road was built so that there would be no delay in carrying building materials and other freight for the magnificent new hotel being built by Mr. Flagler at West Palm Beach. Steamboat connections will be made between Jupiter and the terminus of the road on the northern end until the entire line is completed and ready for operation.

**Little Rock, Hot Springs & Texas.**—The town of Hot Springs, Ark., has raised the subsidy of \$50,000 which the projectors of this line asked, and Little Rock, which was asked to give \$75,000, expects to secure subscriptions of that amount within a few weeks. The survey has already been made from Hot Springs south toward Little Rock. This work is being done by J. P. Nelson, of San Antonio. The company has been organized by Uriah Lott, formerly President of the San Antonio & Aransas Pass road, and he is expected to arrive at Hot Springs from New York in a few days to complete the plans.

**Long Beach Transportation Company.**—This company filed articles of incorporation in Camden, N. J., last week. The new company will operate a railroad between Manahawkin and Long Beach, Ocean County. The principal stockholders are: William J. Thompson, of Gloucester City; George Pfeiffer and Charles S. Ridgway, Camden.

**Metropolitan Union Depot & Railway Company.**—A number of citizens of Omaha interested in securing improved railroad accommodations for the city have organized the above company to carry out a comprehensive plan for new railroad terminal facilities in the city. The plans are pretty well advanced, and so far as completed provide for a station on Farnam and Howard streets with a frontage of 660 ft. on Ninth street. The trainshed will be east of the main building covering Seventh street. The improvements proposed will cost, it is said, about \$1,750,000. The incorporators are: Guy C. Barton, Henry W. Yates, Herman Kountze, Benjamin F. Smith, Charles W. Hamilton, Frank Murphy, John A. Creighton, Fred Metz, Sr., William A. Paxton, Alfred Millard, C. W. Lyman, Milton Rogers, E. L. Stone, Thomas Swobe, John Rush and Charles J. Karback.

**Midland Terminal.**—It has been decided to complete the line into Cripple Creek, Col., as a standard gauge road instead of making it of narrow gauge from Midland to the camp. Money for the construction of the line has been arranged for, and work will be pushed as the weather will permit.

**Moundsville & Benwood.**—C. C. Smith, Chief Engineer of this line, which is to be built from Moundsville to Benwood, W. Va., 12 miles, has commenced the surveys for the right of way at Moundsville, the southern terminus. A part of the right of way will be on the county road.

**Nakusp & Slocan.**—Construction is progressing favorably on this branch road in British Columbia, and grading and bridging will be finished by the end of January. There are nine miles of track now down, and the rails for the balance are at Revelstock, on the Canadian Pacific main line. It is expected that the track will reach Three Forks in May. There are now about 400 men at work on the road, there having been about as many laid off about a month ago. The line will be about 30 miles long, and is built to give the Canadian Pacific a line to the mining district in Southern British Columbia.

**New York, New England & Northern.**—The work of surveying the route of this proposed road, which was intended to furnish a New York City entrance for the New York & New England road, has been abandoned. The engineers who have been at work under direction of Chief Engineer William Olmstead have been disbanded.

**New York, New Haven & Hartford.**—The tunnel on the new location of this road into New Haven, Conn., from the east was completed last week. The tunnel is about 40 ft. long and has required about six months to build. The old Shore Line route through Fair Haven crosses the Quinnipiac River by a 1,200-ft. bridge, and has 12 grade crossings. To widen that line for a second track would have been very costly, and a new route farther to the north was located, which crosses the Quinnipiac River with a bridge 150 ft. long, and does away with the grade crossings in the town. The tunnel is built through the ridge east of the river. The work was described in the *Railroad Gazette* of July 21, 1893, and Sept. 2, 1892.

**Ohio Southern.**—The extension of this road from Springfield to Lima, O., 67 miles altogether, is now open for regular traffic, the first through trains having been run over the road on Dec. 28, as reported last week. This extension was begun in November last, and the work has been carried on all this year without interruption despite the financial disturbances. Most of the track has been laid since July 1, and part of the grading has also been completed since that date, although nearly all that work had been completed in the first half of the year. Before building this extension the Ohio Southern had been dependent entirely on its only connection at Springfield, the Cleveland, Cincinnati, Chicago & St. Louis, for an outlet for its traffic to the north and west. This has been large, consisting chiefly of coal brought from the mines of the company located in Jackson, in southeastern Ohio. The officers state that in one part of 1892, in less than three months, 14,000 loaded cars of coal were brought over the road to Springfield and delivered to its connection there. Blockades caused by the failure of the "Big Four" Company to handle this traffic with any degree of promptness have been very frequent, resulting in the siding of the company along its road being filled with loaded cars for which there was no room at the Springfield yards, causing serious and annoying delays in shipments and tying up the equipment when it should have been earning profits. The company in 1892 decided upon extending the line to Lima and the actual work of construction was begun in November of that year. By the completion of the work the company secures seven important new connections: The New York, Pennsylvania & Ohio, the two western lines of the Pennsylvania, the Cleveland Division of the "Big Four," the Chicago & Erie, the Lake Erie & Western and the Cincinnati, Hamilton & Dayton. It gives the company, therefore, ample outlets for its traffic while securing it a much longer haul on the coal, much of which goes to Chicago. The new line will have a good local business, as it has been located through the largest area in Ohio not traversed by rail road. The cost of the extension has been about \$1,000,000 and has been provided for by the issue of first mortgage bonds. These bonds are limited to \$15,000 per mile of completed main line. About \$2,100,000 of this issue were outstanding before this extension was undertaken.



**Ottawa, Arnprior & Parry Sound.**—This road is now being operated for a distance of 76 miles west of Ottawa, through the towns of Carp, Kilmarn, Galletta, Arnprior, Renfrew, Douglas and Egansville, Ont. The track has been laid to a point about 10 miles west of Egansville called Indian Point. The road has been located as far as Barry's Bay, about 32 miles beyond Egansville. The construction work to that town will be resumed early in the spring. The road is to be built to Parry Sound on Georgian Bay, and it is expected that it will require two seasons more to complete the line. The road is being built as an extension of the Canada Atlantic. The Chief Engineer is George A. Mountain, of Ottawa.

**Philadelphia & Beach Haven.**—This road, extending from Beach Haven to Barnegat City, N. J., which was recently sold under foreclosure, is to be reorganized. That portion extending from Manahawkin to Beach Haven, about 13 miles long, was sold to Samuel Rea, representing the Pennsylvania Railroad. Reorganization under the above name has already taken place with Gen. W. J. Sewall as President. The other portion of the road, between Barnegat Junction and Barnegat City, which was sold to Wilson Brown, will also be reorganized, and both lines will be operated by the Pennsylvania Railroad.

**Philadelphia & Reading.**—The Frankford branch, a suburban line from Crescentville to Frankford, near Philadelphia, which was begun early in 1893, is likely to again be taken up this spring and pushed to completion. The bondholders of the local company have been asked to assent to a plan by which it is proposed to secure the plans of the funds needed to finish the line, and this assent will probably be given. The line will be only three miles long, but includes some heavy work. It is thought that it will be finished by April.

**Pittsburgh, Virginia & Charleston.**—There is again some prospect that this road is to be extended by the Pennsylvania company from its present terminus, at Brownsville, Pa., to Morgantown, W. Va. Several surveys have been made by engineers in the employ of the Pennsylvania Company along the Monongahela River to Morgantown, and last week work by these same engineers was resumed after a suspension of several months.

**Rice Lake, Dallas & Menomonic.**—The seven miles of this road between Rice Lake, on the Minneapolis, St. Paul & Sault Ste. Marie road and Cameron, Wis., were completed in time to be included in the new mileage record for the year 1893. The company is a local one and will operate the road as an independent line. It is not controlled by the "Soo" line. It is proposed to extend it this year about 12 miles beyond Cameron to Dallas, Wis., and a further extension of 35 miles is also projected, but has not been surveyed. The contractors have been George Anthony, of St. Paul, and John Fogleberg, of Rice Lake, Wis. H. E. Clark, of St. Paul, is the Chief Engineer.

**San Diego, Fort Yuma & Atlantic.**—Dwight Braman, Warren Kimball and other Boston directors of the Land company at San Diego, Cal., have organized this railroad. The route proposed is from San Diego northwest to Fort Yuma, Cal., about 180 miles to connect with the Southern Pacific. The new company filed articles of incorporation in California last week, the capital stock being placed at \$7,000,000. This sum, it is reported, has already been subscribed for, chiefly by the stockholders of the San Diego Land Company. The directors of the new road are George H. Hill, Warren Kimball, G. H. Richards, A. H. Thomas, Charles J. Joslyn, Francis S. Eaton and Dwight Braman, the latter acting as President.

**St. Mary's & Southwestern.**—Freight trains have been running over this road for some days and passenger trains will probably be put on in a few days. The line now completed is 10 miles long from St. Mary's to Centerville in Elk County, Pa., and will probably be extended at once about a mile to connect with the Daguerre road. The principal traffic will be lumber and coal. B. F. Hall, of St. Mary's, is President, and Andrew Kaul is General Manager.

**Tuckahoe & Cape May.**—Chancellor McGill, of New Jersey, has ratified the sale of the railroad by the receiver to Logan M. Bullitt, of Philadelphia, and James E. Taylor, of Cape May. The line extends from Tuckahoe Junction, on the South Jersey Railroad, to Cape May, N. J., and the grading has been practically completed, excepting about two miles out of Cape May. The purchase, it is said, removes the last obstacle to the South Jersey's gaining an entrance into Cape May. It is expected to put a large force of men at work this month. The contract for completing the eight miles to Cape May has been let to E. A. Tennis, and efforts will be made to have the road ready for operation by April 1, 1894.

**Western New York & Pennsylvania.**—Trains are again running over the line between Corry and Brocton, Pa., the repairs to the trestles and bridges having been completed. The largest trestles are those just south of Brocton and north of Maryville, the former being over 800 ft. long and 74 ft. high and the latter 150 ft. long and 75 ft. high.

**Wyoming & Utah.**—It is announced in local papers that surveys will be resumed upon this proposed railroad as soon as the weather will permit. About 190 miles of the line has already been surveyed from near Casper, Wyo., bringing the line to a point south of Logan, Utah. Isaac Van Horn, of Boston, is General Manager of the company.

#### GENERAL RAILROAD NEWS.

**Atlantic & Danville.**—The United States Circuit Court has ordered the sale of this road at auction in March next. The company is now operated by Alfred P. Thomas, Receiver, his appointment dating from January, 1891. The main line of the road is 206 miles long from Norfolk west to Danville, with a branch from Belfield northeast to James River, a distance of 55 miles. The latter line is narrow gauge, and is the older portion of the road. The main line to Belfield was built in 1887 and 1888, and the line west of Belfield was built in 1888, and the two years following.

**Atlantic & Pacific.**—Joseph W. Reinhart, John J. McCook and Joseph W. Wilson were appointed receivers of this road on Jan. 4, by Judge N. C. Collier, of New Mexico, in a suit brought by the Mercantile Trust Co., of New York.

**Atchison, Topeka & Santa Fe.**—The following table shows the earnings and expenses of the company for

the month of November and for the five months of the fiscal year:

Month of Nov.	1893.	1892.	Inc. or dec.
Av. operated mileage....	7,480	7,480	
Gross earn.....	\$3,475,695	\$3,712,271	D. \$236,576
Operating expens.....	2,269,532	2,439,639	D. 169,507
Net earn.....	\$1,206,163	\$1,272,632	D. \$66,469
Other receipts.....	40,000	75,000	D. 35,000
Total net earn.....	\$1,246,163	\$1,347,632	D. \$101,469
1/2 annual fixed charges (est.).....	912,000	910,000	I. 2,000
Surplus.....	\$304,163	\$437,632	D. \$133,469
5 Months to Nov. 30.			
Av. operated mileage....	7,480	7,480	
Gross earn.....	\$16,464,615	\$18,131,631	D. \$1,666,986
Oper. expen.....	10,604,567	12,141,483	D. 1,536,916
Net earn.....	\$5,859,948	\$6,290,147	D. \$430,199
Other receipts.....	270,000	375,000	D. 105,000
Total Net earn.....	\$6,129,948	\$6,665,147	D. \$535,199
1/2 annual fixed charges (est.).....	4,710,000	4,595,000	I. 115,000
Surplus.....	\$1,419,948	\$2,070,147	D. \$650,199

The report for the aggregated general system, including the St. Louis & San Francisco, is as follows:

Five months to Nov. 30:			
Av. operated mileage....	9,344	9,344	
Gross earn.....	\$20,075,622	\$22,750,529	D. \$2,674,907
Oper. expen.....	12,892,439	14,699,153	D. 1,806,714
Net earn.....	\$7,183,183	\$8,051,376	D. \$868,193
Other receipts.....	270,000	375,000	D. 105,000
Total net earn.....	\$7,453,183	\$8,426,376	D. \$973,193
1/2 annual fixed charges (est.).....	6,135,000	5,970,000	I. 165,000
Surplus.....	\$1,318,183	\$2,456,376	D. \$1,138,193

The gross earnings of the St. Louis & San Francisco for the five months of the fiscal year were \$3,613,978, a decrease of \$705,220 for the same period of 1892. The net earnings decreased \$435,323, and were \$1,326,206, leaving a deficit of \$98,791 against a surplus of \$386,520 for this road in 1892.

**Central of Georgia.**—Justice Jackson, of the United States Supreme Court, has signed the decree of foreclosure and alternative order of sale of this road and the Southwestern of Georgia, under what are known as the 5,000,000 "tripartite" bonds. The decree was in accordance with the finding of Justice Jackson at Atlanta last June.

A petition has been filed in the United States Circuit Court at Savannah by Receivers Comer and Hayes, of this railroad, asking Justice Jackson to order Receivers Lowery and Comer, of the Savannah & Western Railroad to issue Receivers' certificates to the amount of \$701,000, to reimburse the Central of Georgia for money expended on the Savannah & Western.

**Chicago, Milwaukee & St. Paul.**—The earnings and expenses of this road for the month of November and for the five months of the fiscal year are given in the following table:

Month of November:	1893.	1892.	Dec.
Gross earn.....	\$3,168,075	\$3,499,601	\$331,526
Oper. expen.....	1,889,570	2,091,557	201,987
Net earn.....	\$1,278,505	\$1,408,044	\$129,539
Five months to Nov. 30:			
Gross earn.....	\$15,115,481	\$16,241,447	\$1,125,966
Oper. expen.....	9,402,267	10,357,088	954,821
Net earn.....	\$5,713,214	\$5,884,359	\$171,145

**Evansville & Terre Haute.**—W. H. Tilford, who was recently elected President of the Board of Directors of this company, has issued a circular to the stockholders detailing certain financial transactions under the previous management, and asserting that \$1,100,000 of the securities of the company, properly belonging in its treasury, have been misappropriated. Mr. Tilford says that the company had deposited with its former fiscal agents in New York bonds of a par value of \$460,000, and an approximate cost value to the company of \$340,000; that these bonds were hypothecated by the firm, and, except for \$48,000, the proceeds of the hypothecation have not been transferred to the company. Other bonds, of a par value of \$282,000, are also missing from the treasury, and in addition the sum of \$99,000 has been retained since April, 1893, by the then President of the Board, on a claim for special services, which without authority from the Board and the company, therefore, has a claim for the amount. It was found that advances had been made to the Peoria, Decatur & Evansville company aggregating \$482,000, and the security taken was wholly inadequate for the proper protection of the company.

The present management of the railroad was elected last October after the failure of H. I. Nicholas & Co., and Mr. C. C. Baldwin, who was then President of the Board, was displaced by W. H. Tilford. The company recently issued \$1,000,000 of new stock to pay off the floating debt and thus release the securities pledged therefor. Among these securities were about \$600,000 of the company's general mortgage five per cent. bonds.

**Kansas City, Wyandotte & Northwestern.**—This line from Kansas City to Beatrice, Neb., 175 miles, was sold, under foreclosure proceedings, at auction in Kansas City, Kan., on Jan. 5, and was bid in for \$65,000 by George C. Smith and Bailey P. Waggoner, of Atchison, Kan., representing the Missouri Pacific interests. The road will be reorganized under the name of the Kansas City & Northwestern, and operated by the Missouri Pacific. George J. Gould, Howard Gould, of New York; C. G. Warner, W. B. Doddridge and F. W. Ireland, St. Louis; B. P. Waggoner, W. P. Waggoner, David Kelso and C. M. Rathburn, of Atchison, are the directors of the new company.

**Lehigh Valley.**—A report for the year to Nov. 3 was issued this week. This period includes eight months when the road was operated by the Philadelphia & Reading, four months during which it has been operated by the company. The transportation earnings for the first eight months of the fiscal year ended Nov. 30 were \$12,106,612; operating expenses, including rental of leased lines, \$8,599,427, leaving net earnings of \$3,507,185. For the last four months of the year the transportation earnings were \$6,504,164; operating expenses and rentals, \$4,105,933; net earnings, \$2,398,231, or a total of net earnings for the year of \$5,905,416.66, to which is added the income from investments and other sources of \$363,232.95. General expenses, interest on floating debt, taxes and interest on bonds, including interest on guaranteed bonds and stocks, amounted to \$4,702,236,

leaving a net income of \$1,566,412. Out of this dividends on the common and preferred stock were paid in April and July, amounting to \$1,016,342, leaving a surplus of \$550,070.

**Louisville, Evansville & St. Louis Consolidated.**—E. O. Hopkins, of Evansville, Vice-President of the company, and Jas. H. Wilson, of Delaware, were appointed Receivers of the property on Jan. 4 by Judge Woods in the United States Court at Indianapolis. The application for Receivers was made by Thomas Barrett and J. H. Wilson and alleges that the company has a floating debt of \$900,000, of which \$500,000 is past due; that the pay rolls remain unpaid for two months and that the interest amounting to about \$132,000 due on Jan. 1 has been defaulted. It is said that the present earnings do not equal operating expenses and that securities of the company outstanding as collateral for temporary lines are likely to be sold to the disadvantage of the company. The answer of the company through Vice-President Hopkins admitted the principal allegations of the complaint.

The main line of the road is from East St. Louis to Louisville, Ky., 273 miles. This road has been operated in connection with the Evansville & Terre Haute and the Peoria, Decatur & Evansville, though these are separate corporations, forming what has been called the "Mackay system," D. J. Mackay, of Evansville, being President. The first mortgage, six per cent, consolidated bonds, the defaulting of the interest of which precipitated the receivership, amount to \$3,705,000. The second mortgage consolidated bonds aggregate \$2,432,000, with four per cent. interest. A second series of first and second mortgage bonds, with interest at six per cent., aggregated \$2,670,000. In 1892 the operation of the road was practically suspended for four months by a wrecked tunnel, which caused not only loss of traffic, but heavy expense. The road had not recovered from this when the stringency of 1893 set in, and from June 1 last to Dec. 31 the earnings fell off over \$200,000.

**New York Central & Hudson.**—The gross earnings of the company for various periods are shown below:

Month of December.	1893.	1892.	Inc. or dec.
Miles operated.....	2,334	2,096	I. 238
Gross earnings.....	\$3,580,187	\$3,845,898	D. \$265,711
Quarter ended Dec. 31.			
Gross earnings.....	\$11,827,911	\$12,199,285	D. \$371,373
Six Months ended Dec. 31.			
Gross earnings.....	\$24,039,750	\$24,265,880	D. \$226,130

**New York, Ontario & Western.**—The depression that railroad business has undergone throughout the country for the past few months has been so universal that we take pleasure in announcing instances in railroad operation that show largely increased earnings over other years. The recent reports of the earnings of the railroad should give a great deal of satisfaction to those interested in the property. From it we note the following totals:

Month of November:	1893.	1892.	Gain per ct.
Gross receipts.....	\$325,280	\$279,594	16.0
Oper. expen. and taxes..	226,385	216,372	4.6
Net earnings.....	\$98,906	\$63,222	56.4
Five months ending Nov. 30:			
Gross receipts.....	\$1,826,239	\$1,601,476	14.3
Oper. expen. and taxes..	1,239,535	1,139,465	9.0
Net earnings.....	\$586,704	\$462,011	26.0
Surp. above fix'd charg's	292,617	210,357	39.0

**Northern Pacific.**—The heavy decreases in the gross earnings, which have been reported for several months still continue, and in December were \$646,836, on earnings of \$1,212,328 in 1893.

**Philadelphia & Reading.**—The annual meeting of the railroad company, which has been looked forward to with unusual interest on account of the attempt of Isaac L. Rice, the former London agent of the company, to secure proxies to control the election, was held in Philadelphia on Jan. 8 and resulted in the re-election of the present Board of Managers. There were over 400,000 shares voted at the meeting, 382,230 shares being voted in favor of the re-election of President Harris and the directors nominated with him; 117,112 shares were voted in opposition. Mr. R. B. Hartshorn, Chairman of what is called the New York Security Holders' Committee, which was organized to help Mr. Rice, addressed the stockholders, criticising the Receivers, repeating the charges that have been made before and attempting to draw out a statement from President Harris in regard to the payment made to the Boston firm of stockbrokers to secure the return to the company of its collateral placed with the firm while the negotiations for the purchase of the stock of the Boston & Maine and the New England were being carried on by President McLeod.

The annual report for the year ending Nov. 30, prepared by the Receivers, was read at the stockholders' meeting on Jan. 8. The report shows gross receipts by the railroad company for the year from traffic, \$22,328,846; gross expenses, \$13,369,423; earnings from traffic, \$9,959,423; profit from other sources, \$609,072; total, \$10,568,495. From this must be deducted: Rentals, \$2,907,028; interest account, \$5,273,364; profit and loss, \$243,067; taxes, \$200,683; terminal trackage, \$350,757; equipment payments, \$1,468,390; improvements, including Broad street and Lehigh avenue, Philadelphia, \$225,706; total, \$10,675,188; deficit, \$806,693.

**Coal & Iron Company.**—Gross receipts, \$21,586,863; gross expenses, \$23,482,672; profit, \$1,104,195; less interest, \$1,290,844; deficit, \$186,649; deficit for two companies, \$802,342.

The Speyer loan to the company has been extended for a period of three months, \$500,000 additional collateral having been deposited under the agreement made last October.

**Quaker City Elevated.**—The Court of Common Pleas of Dauphin County, Pa., has rendered a decision which is a substantial victory for this road. The suit was that of the State against the Northeastern Elevated, controlled by the Quaker City Elevated, and it sustains the validity of the charter of the road. Considerable money was spent on the construction of the elevated railroads in Philadelphia early last summer, but the companies were obliged to stop work on account of the numerous special injunctions granted by the local courts to property owners, against the companies, on the plea of their illegal incorporation. In order to settle this question as rapidly as possible, the Attorney-General of the state brought suit by *quo warranto*, in the State's Court of Dauphin County, and as far as that court can determine the question, the opinion just given by Judge Macpherson settles the chartered rights of the elevated railroad.



companies. Before work can be resumed, however, the Supreme Court of the state will have to review this opinion, but it is believed that it will follow the decision of the lower court.

**Richmond & Danville.**—The Receivers have issued a statement of operations covering the period from June 17, 1892, to July 31, 1893, when Messrs. Huidekoper and Foster were Receivers; also from July 31, 1893, to Dec. 31, 1893, when Messrs. Spencer, Huidekoper and Foster were Receivers. The Richmond & Danville proper was operated by Receivers Huidekoper and Foster from June 16, 1892, to July 31, 1893, with the following results:

Cash from R. & D. Co.	\$480,428
Earnings	13,451,755
Miscellaneous sources	297,518
Traffic balances collected	421,316
Rentals and old accounts	775,038
<b>Total receipts</b>	<b>\$15,432,055</b>
Interest and rentals	\$3,249,482
Car trust payments, etc.	486,368
Interest on Receivers' certificates	56,400
Other operating expenses (partly prior to June 16)	11,498,480
Cash on hand	141,325
<b>Total payments</b>	<b>\$15,432,055</b>

The receipts from Aug. 1 to Nov. 30 under the present Receivers were \$3,863,984, the operating expenses \$2,998,109; and the interest and rentals \$591,457, leaving \$247,419 in cash on hand. The December receipts are estimated at \$1,101,053, and disbursements at \$757,506, showing an estimated cash balance on Jan. 1 of \$343,547, after allowing for the Nov. 30 cash balance. The requirements for interest payment and rentals for Jan. 1 were \$626,219, making a cash deficit of \$282,672. This accounts for the default in interest on securities which were left undisturbed by the plan of reorganization, \$582,775, as follows: R. & D. consolidated 6's, \$179,910; R. & D. debentures, \$302,940; York River 2ds and stock, \$24,925; C., C. & A. 1sts, \$70,000.

Under the original receivers the Georgia Pacific showed a deficit of \$279,352 from June 17, 1892, to July 31, 1893; under the present Receivers it showed a surplus of \$114,089 from Aug. 1 to Dec. 31, 1893. Payments for interest, etc., in the first stated period were \$456,214, and in the second \$145,943.

The Charlotte, Columbia & Augusta was operated by the original receivers from June 17, 1892, to July 31, 1893, at a net loss of \$142,063, after paying \$274,875 for interest and organization expenses. The present Receivers have operated the property since the date last mentioned at a profit of \$49,351, having paid \$19,146 for interest and organization expenses.

The operation of the Columbia & Greenville from June 17, 1892, to Dec. 31, 1893, resulted in a profit of \$44,616, after payments of \$151,517 for interest and organization expenses.

**Savannah & Atlantic.**—Justice Jackson, of the United States Supreme Court, has authorized the Receivers of the Central of Georgia to issue \$40,000 in Receivers' certificates to provide for the rebuilding of this railroad. The line is about 20 miles long, extending from Savannah to the seashore at Tybee Island. The railroad was almost completely washed away during the severe storm on the South Atlantic Coast in 1893. The Receivers declined to authorize the expenditure necessary to again put the road in shape for operation, and no trains have been run since that period. The business men of Savannah who were interested in having the line operated carried the question of rebuilding it before Justice Jackson when the Receivers declined to authorize the repairs, and Justice Jackson has now issued the order referred to above.

**South Bound.**—The operation of this railroad was assumed by the Florida Central & Peninsular Company on Jan. 1, and the line will be designated as its South Bound Division.

**Southwestern of Georgia.**—The directors of this railroad, operated since 1869 under a guaranty by the Central of Georgia, have voted to take the road from the control of that company and to provide an independent working organization. It is proposed to provide for purchase or lease of equipment, and to secure control of the Montgomery & Eufaula and the Mobile & Girard lines. The officers are instructed to issue \$6,000,000 five per cent. mortgage bonds on all the property of the company, with the intention of using \$2,750,000 for the liability of the Southwestern Company under the "tripartite" bonds and to pay for equipment and betterments. For acquiring control of the Montgomery & Eufaula and the Mobile & Girard lines \$3,250,000 is to be used. The above is the substance of resolutions approved by a majority of the directors at a meeting held last week. The stockholders will meet on Feb. 6 to vote upon the question. The main line of the road extends from Macon to Columbus, but with branches it owns over 300 miles of road. The stockholders have been receiving seven per cent. dividends under the lease to the Central of Georgia, but the road has not been earning sufficient to pay that dividend. Justice Jackson, of the United States Supreme Court, recently authorized the Receivers of the Central of Georgia to defer payment of rental to any leased line not earning such rental. President Baxter, Directors Raoul and a majority of the Board believe that the road could be operated to better advantage if separated from the Central of Georgia system. This policy is opposed by Receiver Comer and the Savannah directors.

**Texas, Louisiana & Eastern.**—An application for a Receiver for this road has been made before the United States Circuit Court at Galveston, Tex., by S. A. Walker, trustee of the mortgage. The appointment of a Receiver will be objected to by the railroad company, and the court has set Jan. 18 at Sherman, Tex., as the time and place for a hearing on the petition. The road extends from Conroe, in Montgomery County, Tex., east to a connection with the Houston, East & West Texas, and to within a few miles of the Trinity River, the entire length of the completed road being about 40 miles. It was built in 1892, and a few miles in the early part of 1893.

**Union Pacific, Denver & Gulf.**—Judge Hallet, of the United States Circuit Court in Denver, last week denied the petition of Receiver Trumbull to be appointed trustee for all property of the company outside of Colorado. The petition was contested by the attorneys for the Union Pacific system.

## TRAFFIC.

### Traffic Notes.

The Union Pacific now sells 3,000-mile tickets at the same rate as is charged for 1,000-mile tickets, but with an allowance of 250 lbs. of baggage.

It is reported from Jefferson City that the express companies have refused to reduce merchandise rates in the State of Missouri 10 per cent., as recently ordered by the Railroad Commissioners.

A movement is under way at Galveston, Tex., to organize a freight bureau to be maintained jointly by the Cotton Exchange, Chamber of Commerce, Board of Trade and Wharf Company.

A tourist sleeping car has been put on between Philadelphia and San Francisco to run once a week over the Baltimore & Ohio, Chicago, Rock Island & Pacific, Denver & Rio Grande, Rio Grande Western and Southern Pacific.

The secretary of the National Car Service Association has made up a statement of average detention at various points during the quarter ending Sept. 30 last. At Louisville it was only .84 of a day per car, while the longest detention reported was that at Omaha, 2.55 days per car. The average detention throughout the country was 1.60 days. Jackson and Vicksburg, Miss., and Baton Rouge, La., are now in the New Orleans Association, and Shreveport will soon be.

The Supreme Court of Kansas has dissolved the injunction granted by the Atchison County District Court to the Sym's Grocery Company restraining the railroad from reducing rates on carloads of sugar, coffee, beans and canned goods. The Court held that it had not been shown that the proposed reduction would operate to the disadvantage of the plaintiff or to the benefit of other shippers. A motion has been made for a rehearing, and the injunction will continue in force until the argument is heard.

It is reported in the newspapers that the railroads taking freight east from Memphis have refused to longer recognize the various fast freight lines which have had contracting offices in that city. It is alleged that these fast freight line agents made unauthorized reductions in the rates on cotton. The fast freight lines shut out include the Cumberland Gap Dispatch, Blue Line, Lackawanna Line, Hoosac Tunnel Line, White Line, Nickel Plate Line, West Shore Fast Freight and the Virginia, Tennessee & Georgia Air Line.

The new local freight tariff for the California lines of the Southern Pacific was put in effect Jan. 1. It will be remembered that the rates for this tariff were made up several months ago and that there was some little stir in San Francisco over their premature disclosure by clerks in the railroad company's office. It is said that many rates are reduced from 20 to 33 per cent., but that the average is about 10 per cent. The San Francisco Examiner says that the changes have been made on a rational policy of giving to each large city the business of the territory naturally tributary to it.

The roads between Colorado and the Missouri River have issued new tariffs on eastbound freight, making reductions in about 50 commodities, including iron ore, pig iron and dry goods. Some of the reductions are very large. Ore to the Missouri River is reduced from 25 cents to 10; pig iron from 32½ to 25, and dry goods from \$1.92 to \$1.27. There have been some changes in west-bound rates, seven commodities being raised.

When it comes to hauling empty cars 2,000 miles, the question whether a given freight rate is remunerative or not receives more attention than is usually the case. This is illustrated in a statement recently published in a Tacoma paper that the Northern Pacific and the Great Northern have both notified the lumber shippers of Washington that at the present rates shingles will not be accepted for shipment to St. Paul and other Eastern ports except as they can be sent in cars that move West loaded. The surplus of cars is now in the East, and empty cars will not be sent west for such unprofitable freight as shingles. If the shippers will accept an advance in the rates to 60 cents per 100 lbs. to St. Paul, and 65 cents to Chicago, the roads will consider the question of sending cars west for the sole purpose of getting shingles.

The case of the Little Rock & Memphis against the St. Louis, Iron Mountain & Southern, in the United States Court at Little Rock, has been decided in favor of the defendant. The plaintiff charged, first, that the defendant refused to receive freight from it except upon the prepayment of all charges thereon, while receiving freight from all other persons and corporations without demanding the prepayment of freight charges, but collecting such charges upon the delivery of the goods as is customary in the railroad business; and, second, that the defendant refuses to accept interstate freight at Little Rock except upon prepayment of charges upon through billing from the line of the plaintiff, while it accepts freight from all other lines; and that the Iron Mountain makes an undue reduction in the fare of passengers over its parallel line from Memphis. The Iron Mountain seems to have won on all the points.

### Chicago Traffic Matters.

CHICAGO, Jan. 10, 1894.

The transcontinental passenger officials have made but little headway in settling the Canadian Pacific's demand for a differential. The Committee was unable to agree on a report and the whole question has been thrashed over to no purpose. The meeting is still in session.

The total eastbound shipments, exclusive of livestock, from Chicago for the year 1893 amounted to 3,281,280 tons, against 3,749,652 tons in 1892, a decrease of 468,372 tons. The tonnage was divided among the several railroads in the following proportion:

Road.	Tons.	P. c.
Michigan Central	42,289	12.9
Wabash	225,033	6.8
Lake Shore & Michigan Southern	590,020	18.0
Pittsburgh, Ft. Wayne & Chicago	425,864	13.0
Pittsburgh, Cincinnati, Chicago & St. Louis	373,179	11.4
Baltimore & Ohio	188,158	5.7
Chicago & Grand Trunk	288,558	8.8
New York, Chicago & St. Louis	278,317	8.5
Chicago & Erie	361,285	11.1
C., C. & St. Louis	125,577	3.8
<b>Total</b>	<b>3,281,280</b>	<b>100.0</b>

The shipments for the year, as above, were made up as follows:

Articles.	Tons.
Flour	245,776
Grain and millstuffs	1,435,432
Provisions, lard, etc.	163,775
Dressed beef	601,446
Grass seed	30,737
Flaxseed	84,953
Broom corn	3,793
Butter	68,504
Hides	90,659
Wool	14,955
Lumber	229,330
<b>Total</b>	<b>3,281,280</b>

Shipments by lake lines for the season of 1893 amounted to 3,063,382 tons, of which 146,494 tons were flour, 2,755,957 tons grain and millstuffs, 20,190 tons provisions, 128,813 tons grass seed, 3,737 tons butter and 2,461 tons hides.

The shipments of eastbound freight, not including livestock, from Chicago, by all the lines, for the week ending Dec. 30 amounted to 113,516 tons, against 77,019 tons during the preceding week, an increase of 36,497 tons, and against 66,570 tons for the corresponding week last year. The apparent large increase over the preceding week is partly accounted for by the inclusion in this statement of one day of the week ending Dec. 23, but is largely due to a rush of shipments prior to the advance in rates announced for Jan. 1. The proportions carried by each road were:

Roads.	W'k to Dec. 30.		W'k to Dec. 22.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	21,308	18.7	12,396	16.1
Wabash	7,417	6.5	4,079	5.3
Lake Shore & Michigan South	14,964	13.2	12,182	15.9
Pitts., Ft. Wayne & Chicago	20,717	18.3	13,175	17.1
Pitts., Cin., Chicago & St. Louis	14,322	12.6	8,579	11.2
Baltimore & Ohio	1,320	3.8	2,886	3.7
Chicago & Grand Trunk	9,888	8.7	7,597	9.8
New York, Chic. & St. Louis	10,982	9.7	5,499	7.1
Chicago & Erie	6,534	5.8	7,989	10.4
C., C. & St. Louis	3,064	2.7	2,637	3.4
<b>Totals</b>	<b>113,516</b>	<b>100.9</b>	<b>77,019</b>	<b>100.0</b>

Of the above shipments 10,638 tons were flour, 70,887 tons grain and millstuffs, 13,255 tons cured meats, 10,048 tons dressed beef, 1,373 tons butter, 1,935 tons hides and 2,423 tons lumber. The three Vanderbilt lines carried 41.6 per cent., the two Pennsylvania lines 30.9 per cent.

(Other Chicago traffic news will be found on page 25).

### Freight Traffic at Kansas City in 1893.

The Kansas City Times in a review of the business of the city for the past year devotes a column to the freight business of the roads centering at that point. The shipments of merchandise out of the city were heavier than in 1892 in all particulars except agricultural implements. The increase of shipments to Kansas and Oklahoma shows that Kansas City is gaining ground as a jobbing center. The receipts of live stock increased 2,658 cars, while the shipments decreased 3,675 cars, showing that the packing-houses of the city had taken more animals than in 1892. [The totals of the live stock traffic are shown under another head.] Kansas City merchants have taken advantage of the new Chesapeake & Ohio Steamship Line for imports as well as exports. During the past year the first shipment of Kansas City grain has gone to Europe through a South Atlantic port, Port Royal, S.C. The day has passed when winter export rates from Kansas City can be dictated by the Eastern trunk lines. More than 50 per cent. of the grain from trans-Missouri territory through all the gateways south of Omaha now goes to market by Southern roads. The length of track in and around Kansas City is now 326 miles. The article contains a table showing partial statistics for the 17 railroads entering the city, of the number of passenger and freight trains in and out of the city, some of the roads refusing to give all the statistics. The totals of the figures given are as follows: Passenger trains in and out, 76,104; freight trains in, 30,775; out, 39,531. The number of loaded cars switched for connecting lines during the year ending June 30 last was 268,581, two roads of considerable importance being left out for lack of information.

### Kansas City Live Stock Traffic.

The total receipts of stock at the Kansas City stock yards for the year 1893 amounted to 99,755 cars as against 97,462 cars for the year 1892. The percentage received by the various lines as follows:

Road.	1892.		1893.	
	Cars.	P. c.	Cars.	P. c.
Atchison	31,325	32.1	35,559	35.7
Burlington	6,652	6.8	5,478	5.5
Chicago & Alton	1,105	1.1	1,077	1.1
Chicago Great Western	196	.2	151	.2
K. C., Ft. Scott & Memphis	6,009	6.2	5,416	5.4
K. C., Osceola & So.	1,411	1.5	1,440	1.5
K. C. Pitts. & Gulf	557	.6	834	.8
K. C. Suburban Belt	4	.0	4	.0
K. C., Wyandotte & N. W.	2,160	2.2	2,092	2.0
Mo. Pac.	18,471	20.0	18,348	18.4
Chic. Mil. & St. Paul	620	.7	638	.6
Mo., Kan. & Tex.	4,522	4.6	5,400	5.4
C. R. I. & P.	12,269	12.6	13,397	13.4
Union Pacific	10,757	11.1	9,771	9.8
Wabash	407	.4	316	.3
<b>Total</b>	<b>97,462</b>	<b>100.0</b>	<b>99,755</b>	<b>100.0</b>

The number of head of each kind of stock was as follows:

	1892.	1893.
Cattle	1,479,078	1,660,807
Calves	92,077	96,021
Hogs	2,397,477	1,918,373
Sheep	328,268	569,517
Horses and mules	32,505	35,097

The total shipments for a corresponding period were distributed as follows:

	1892.		1893.	
	Cars.	P. c.	Cars.	P. c.
Atchison, T. & S. F.	12,735	29.9	9,388	23.8
C., B. & Q.	7,691	18.1	6,627	16.8
Chicago & Alton	4,888	11.5	6,071	15.4
Chicago Gr. Western	183	.4	259	.7
K. C., Ft. Scott & Memphis	480	1.1	603	1.5
K. C., Osceola & So.	170	.4	207	.6
K. C. Pitts. & Gulf	24	.0	63	.1
K. C., Wyandotte & N. W.	196	.5	312	.8
Mo. Pac.	1,969	4.6	2,043	5.2
Chl. Mil. & St. Paul	6,002	14.1	4,582	11.7
Mo., Kan. & Tex.	501	1.2	150	.4
C. R. I. & P.	1,627	3.8	1,725	4.4
Union Pacific	1,123	2.6	990	2.5
Wabash	5,032	11.8	6,346	16.1
	42,621	100.0	39,366	100.0

The number of animals of each kind as follows:

	1892.	1893.
Cattle	201,016	261,576
Calves	40,900	28,847
Hogs	591,623	520,694
Sheep	219,230	196,892
Horses and mules	22,120	21,394